DRAFT ENVIRONMENTAL ASSESSMENT
for
ENVIRONMENTAL RESTORATION
at
SQUAK VALLEY PARCEL, ISSAQUAH, WASHINGTON

August, 2003

US Army Corps of Engineers ®
Seattle District

Squak Valley Environmental Restoration
Issaquah, King County, Washington
Draft Environmental Assessment
August, 2003

Responsible Agency: The responsible agency for this project is the Seattle District, U.S. Army Corps of Engineers (Corps).

Abstract: This draft environmental assessment evaluates the potential impacts of the proposed creation of two backwater channels, enhancement of an existing tributary to Issaquah Creek, and associated planting and grading at the Squak Valley parcel in Issaquah, Washington. The primary purpose of the project is to create off-channel rearing and refuge habitat for salmon and trout. Associated riparian plantings will benefit local wildlife by improving habitat value along the riparian corridor of Issaquah Creek. As a component of this restoration project, the city of Issaquah will require several recreational features in keeping with the City's master plan. The proposed work is planned for the summer of 2004.

THE OFFICIAL COMMENT PERIOD ON THIS DRAFT ENVIRONMENTAL ASSESSMENT ENDS ON **SEPTEMBER 29, 2003**.

This document is available online under *Squak Valley Habitat Restoration* at:
http://www.nws.usace.army.mil/ers/doc_table.cfm

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TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

ACRONYM INDEX

BE: Biological Evaluation

CFR: Code of Federal Regulations

DPS: distinct population segment

EFH: Essential Fish Habitat

ESA: Endangered Species Act

ESU: evolutionarily significant unit

FWCA: Fish and Wildlife Coordination Act

NEPA: National Environmental Policy Act

NOAA: National Oceanic and Atmospheric Administration

NWP: Nationwide Permit

RM: river mile

USC: United States Code

USFWS: United States Fish and Wildlife Service

WDFW: Washington Department of Fish and Wildlife

WDOT: Washington Department of Transportation

WQC: Water Quality Certification

WRIA: Water Resource Inventory Area

1. INTRODUCTION

The United States (U.S.) Army Corps of Engineers (Corps) proposes restore and create off-channel fish habitat adjacent to Issaquah Creek in southern Issaquah, Washington. The proposed work is planned for the summer of 2004. In accordance with the National Environmental Policy Act (NEPA), this document examines the potential impacts and potentially feasible (i.e. reasonable) alternatives of the proposed environmental restoration project.

2. BACKGROUND

2.1. Project Location

The approximately 10-acre Squak Valley parcel (Section 3, Township 23N, Range 6E, Willamette Meridian) is located just south of Southeast 96th Street and between Issaquah-Hobart Road and Issaquah Creek in King County, Washington, within the City of Issaquah (Figure 1). The parcel is owned by the City of Issaquah. A small tributary (WRIA Trib. 0199) flows along the northern edge of the property before draining into Issaquah Creek. The site lies at approximately river mile (RM) 4.6 of Issaquah Creek.

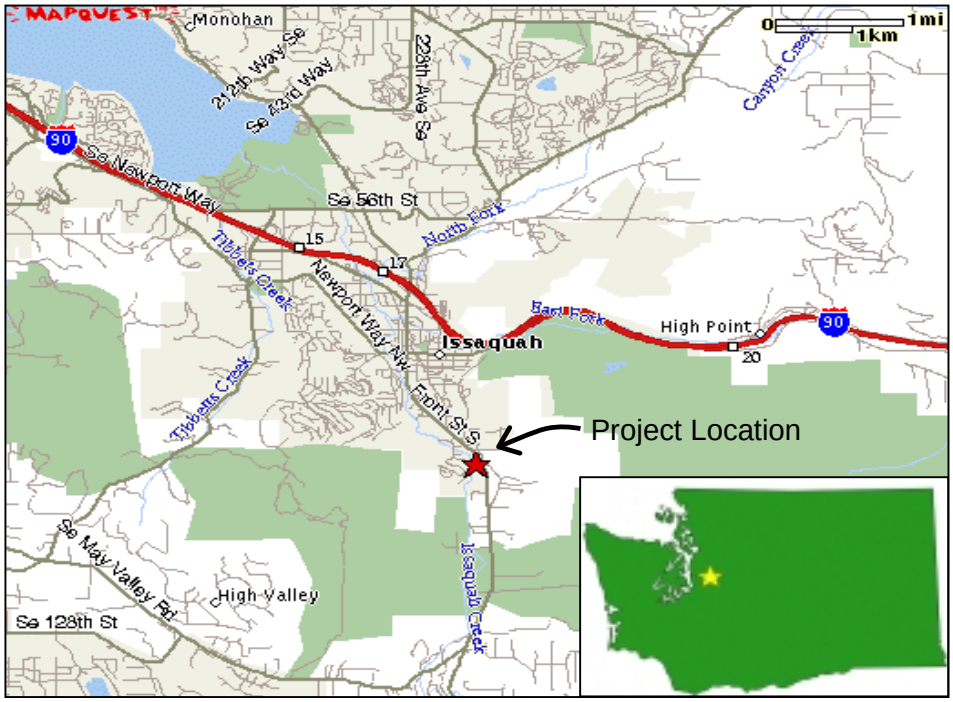

Figure 1. Project Location

2.2. Project Authority

The proposed project is authorized under Section 206 authority of the Water Resources Development Act of 1996, P.L. 104-303. This authority authorizes the Secretary of the Army to carry out aquatic ecosystem restoration and protection projects if the Secretary determines that the project will improve the quality of the environment, is in the public interest, and is cost-effective. The local sponsor for the project is the City of Issaquah.

2.3. Need and Purpose

Over the last century, the lower portion of Issaquah Creek has been channelized and otherwise altered to the detriment of local fish and wildlife populations. In particular, lower Issaquah Creek has few stable off-channel habitats, which are essential for full production of chinook salmon, coho salmon and steelhead trout. A recent report (Parametrix, 2002) identified lack of off-channel salmonid habitat as a limiting factor for mainstem Issaquah Creek. Side channels and backwater sloughs are especially important for chinook salmon rearing from February through July. The off-channel areas and wetlands during high flow will reduce velocities in the main creek channel, thereby reducing scour of salmon redds (two chinook salmon redds were observed adjacent to the property in Issaquah Creek during fall 1999).

The proposed project is intended to restore and create off-channel rearing and refuge habitat for fish and wildlife, including salmon and trout species, along the Issaquah Creek corridor to restore these currently limiting functions (Parametrix, 2002). Associated riparian plantings will benefit local wildlife by improving habitat value along the riparian corridor of Issaquah Creek.

As a component of this restoration project, the city of Issaquah requires several recreational features in keeping with the City's master plan. These recreational features at the project site will be designed to promote education and day use.

3. DESCRIPTION OF PROPOSED PROJECT

The proposed project consists of excavating two backwater channels (Figure 2). While isolated from the creek channel, two dead-end, backwater channels would be excavated. Each channel would incorporate two deeper pools, but the channels would be sloped and excavated to ensure a positive gradient to the creek channel and the pools would be permanently wetted. The new channels would be connected to Issaquah Creek by removing two sections of the existing levee along the creek shoreline.

The northern and southern channels would be 280 and 320 feet long as measured along the channel bottom (i.e. the side slope at the channel end is not included), respectively. Bottom width of the channels would vary between seven and twelve feet and the channel shorelines would be graded to slopes varying between 2:1 (horizontal to vertical) and 4:1. Each channel would incorporate three wetland bench areas that would be planted with emergent native sedge species.

At least 10 pieces of large woody debris would be placed along the shoreline of each channel and the areas bordering the channels would be planted with a variety of native plant species. The channel inlets include bioengineered streambank stabilization that includes a riprap toe, native plantings, and soil lifts by geotextile fabric. A low berm would be constructed along the Issaquah-Hobart road to contain periodic floodwaters on the project site and to protect the road and houses to the north from flooding.

Other restoration work includes enhancement of Tributary 0199 (along the southern project boundary) by grading the existing near-vertical banks to a shallower slope and planting native plant species.

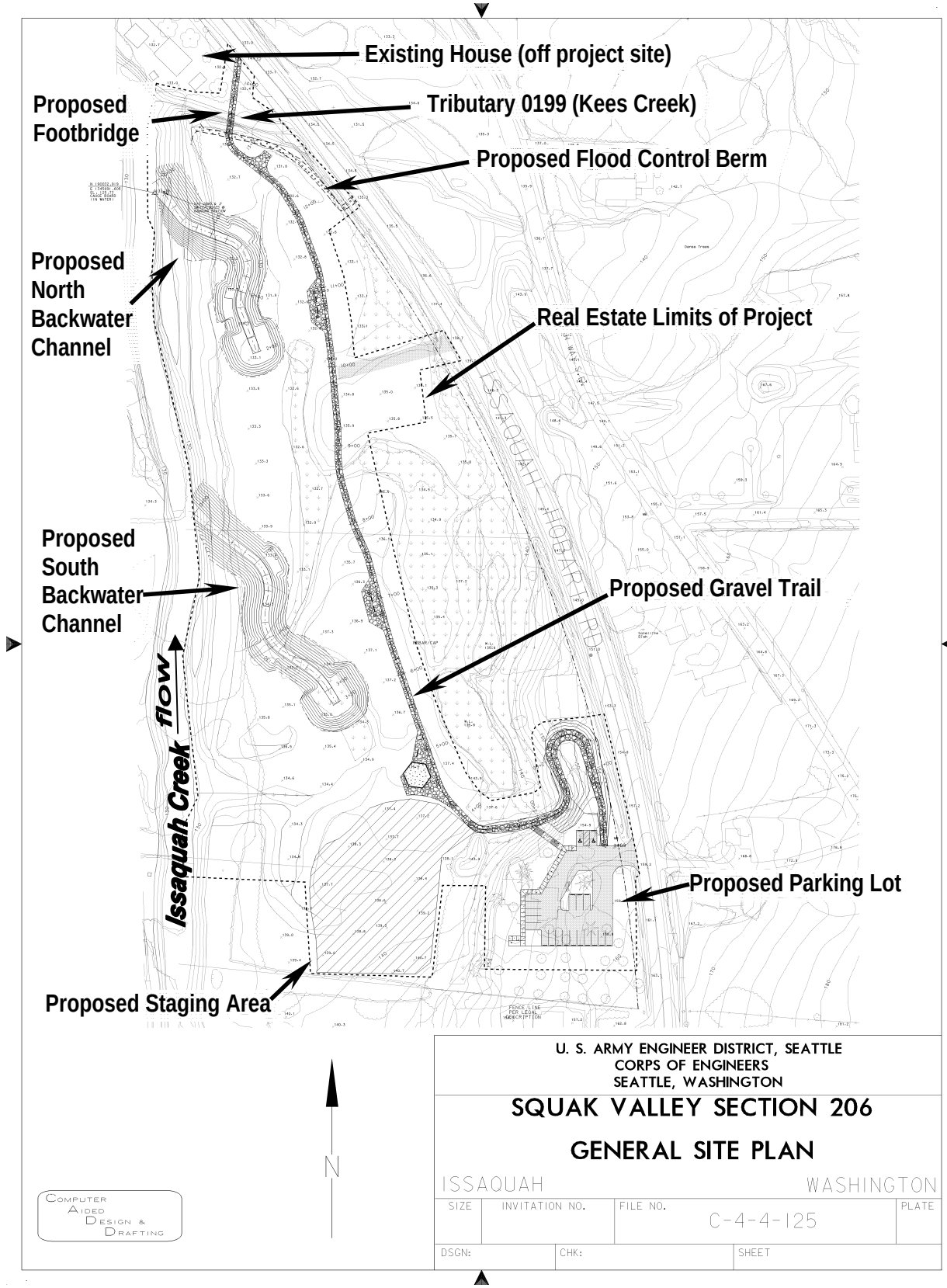

Figure 2. Proposed Project Layout (see Appendix A for detailed design drawings)

Recreation features that would be constructed include a gravel trail, picnic benches, and open areas. The gravel trail would start at a small parking lot that would be constructed on a terrace at the southeastern corner of the site. The trail alignment will follow the route of the construction access roads and will also provide maintenance access to the site following construction. The trail crosses one narrow wetland area. This wetland crossing will consist of a gravel path that is laid at the existing ground surface, thereby providing connectivity between the backwater channels and the undisturbed wetlands east of the trail (see Section 6.5.5).

Construction would be accomplished with standard excavation equipment which may include dump trucks, track hoes, backhoes, small bulldozers, tractors, graders, front-end loaders, pumps, hydroseeding truck, and hand shovels and rakes. Construction is anticipated to occur during a window between April and October 2004. Work in Issaquah Creek or Tributary 0199 would be restricted to the fish window of June 15 to July 31. Vegetation would be planted in the fall following construction. Excess excavated material would be disposed on uplands at a site about ¼-mile south of the project site.

4. ALTERNATIVES

4.1. No Action

Under the "No Action Alternative," no work would be done at the Squak Valley parcel. If mowing of the field continues, the site would remain in its existing condition for the foreseeable future. If mowing ceases, the project site would likely gradually change to a mix of blackberry thicket and alder and cottonwood forest. The existing creek along the project site appears fairly stable and would likely remain that way in the absence of disturbances from falling trees, alteration of the western streambank, or upstream alterations in land-use.

4.2. Alternatives Not Considered in Detail

During the planning process, various alternatives were initially considered. As an initial screen for these planning alternatives, the Corps performed an analysis of environmental benefits to fish and wildlife habitat in relation to project cost performed. Following more detailed design work, technical review of alternative feasibility was performed on the remaining alternatives. The alternatives described below were considered at various stages during the planning process, but, for the reasons stated below, will not be carried forward for further evaluation because the environmental benefits were not sufficient to justify the costs, or they entailed unacceptable environmental impacts.

4.2.1. Side Channel with Two Levee Breaches

This alternative would involve construction of a side channel along Issaquah Creek by creating two openings in the existing levee and excavating an existing swale in the field. The upstream levee breach would consist of a riprap weir designed to allow flow to enter the side channel only during high water events (roughly 2 to 3 times per year). The lower portion of the channel would be inundated by backwater at normal winter flows. Total length of the side channel would be about 1000 feet long. Properly-sized gravels and large woody debris would be placed in the side channel to provide refuge and rearing habitat for anadromous and resident salmonids.

In common with the proposed project (Section 3), riparian vegetation would be planted along the channel, a low berm would be constructed along Issaquah-Hobart Road, the side slopes of Tributary 0199 would be graded and planted, channel inlets would be stabilized with bioengineering techniques, and recreational features would be incorporated into the site design. Construction equipment and techniques would be similar those described for the proposed project.

Under this alternative, water velocities in the side channel would be similar to the creek channel when the stream was high enough to crest the weir at the head of the channel. Such high velocities would flush rearing fish out of the channel and decrease the suitability of the site as refuge for fish. Also, to perform as intended, the weir would require large quantities of riprap to be placed in the riparian zone of the creek. This alternative would not fully provide the intended functions of fish rearing and refuge habitat, may negatively impact the main channel of the creek by the construction of the large weir, and will not be carried forward for further evaluation.

4.2.2. Remove the Entire Levee, No Channels

This alternative would remove the existing levee along the entire eastern property boundary along Issaquah Creek. The Issaquah-Hobart Road and houses to the north would require new protection from floods in the form of a low levee or berm located adjacent to the road. The levee supports a dense growth of alder (*Alnus rubra*), big leaf maple (*Acer macrophyllum*), cedar (*Thuja plicata*) and Douglas fir (*Psuedotsuga menziesii*) and willows (*Salix* spp.) that provide shade to the creek. While removing the existing levee would allow the creek to flow freely across the property during high flows, all trees and other vegetation on the levee would be eliminated. Over decades, levee removal would provide an opportunity for the creek channel to occupy portions of the Squak Valley site, but any eastward movement of the channel would put existing development and infrastructure at risk. Fish would have access to the floodplain during high flows but levee removal would not provide rearing habitat since the creek channel would remain a straight run with little habitat diversity and complexity. Based on the impacts from removing the existing trees on the levee, the risk that channel changes may impact off-site areas, and the limited benefits to fish habitat, this alternative will not be carried forward for further evaluation.

4.2.3. Two Levee Breaches, No Channels

Several levee breaches along the project reach would allow higher flows to inundate the floodplain many times during the winter. Except at the levee breaches, the trees and willows on the levee would remain in place to provide creek shading and wildlife habitat. The road and houses to the north would not be protected to the current level of flood protection, so a secondary levee or berm would be constructed. As with total levee removal, fish would access the project site for short periods when high flows flood the site, but no rearing habitat would be created. Since this alternative is similar to the proposed project but provides substantially less fish habitat benefits, it was not be carried forward for further evaluation.

5. EXISTING CONDITIONS

5.1. Physical Characteristics

The Issaquah Creek Basin encompasses approximately 61 square miles (Kerwin 2001). The basin's headwaters flow from the steep slopes of Cougar, Squak, Tiger and Taylor Mountains. Elevations range from more than 3,000 feet at the peak of Tiger Mountain to near sea level at the mouth of Issaquah Creek. The basin includes Issaquah Creek and its tributaries Holder, Carey, Fifteenmile and McDonald Creeks and the North and East Forks of Issaquah Creek, as well as Tibbetts Creek.

The Squak Valley parcel occupies a floodplain terrace in a rural area in the southern part of Issaquah. The majority of the site is low lying and, in the absence of the levee along Issaquah Creek, would likely flood frequently during the winter. The southeast corner of the site consists of an upper terrace. A steeply sloped hillside leads from the upper to lower terrace.

The reach of Issaquah Creek bordering the Squak Valley parcel is straight and a consistent width. The majority of the channel is a riffle/run complex, with only one piece of large wood in the channel along the left bank in the project reach. Cobbles and gravel dominate the creek substrate, with a veneer of sand along the shorelines during lower flows. Tributary 0199, a perennial stream, flows into Issaquah Creek along the northern boundary of the site.

Streambanks of both watercourses at the Squak Valley parcel appear to be stable, but are likely the result of historical shoreline manipulation. Riprap bank protection along the project reach is sporadic and superseded in function by the mature bank vegetation. Immediately downstream of the mouth of Tributary 0199, a revetment of large rock protects the right bank. Upstream of the south boundary of the project site, a rock bulkhead stabilizes lawn along the left bank.

The proposed disposal site is located on an elevated terrace adjacent to Issaquah-Hobart Road. A residence with adjacent fields and scattered trees dominate the portion of the site that would be used for disposal. The disposal footprint is 3.6 acres of uplands. A wetland area occurs in the southwestern portion of the site and continues on the lower terrace along Issaquah Creek. No material would be placed closer than 50-feet from the edge of the wetland area.

5.2. Hydrology and Hydraulics

Issaquah Creek is one of the larger creeks in the Lake Washington watershed, with streamflows ranging from several hundred cubic feet per second (cfs) in the winter to summer lows of about 30 cfs. Mean flow is 134 cfs. Drainage area for Issaquah Creek is about 61 square miles, most of it upstream of the Squak Valley parcel. Unit area discharges have been calculated for the basin and range from 0.06 to 0.12 cfs/acre, with a mean flow of 0.099 cfs/acre. This number is relatively large compared to other highly urbanized Lower Puget Sound basins that are typically in the 0.078 cfs/acre range (King County, 1991). The large unit area discharge in the Issaquah Creek basin is the result of greater local precipitation, generally steeper topography, and a local geology dominated by significant amounts of bedrock and till. The 100-year flood discharge is estimated to be 3,160 cfs and the 10-year flood discharge to be 1,960 cfs.

5.3. Water Quality

Water quality in the basin is generally good. Although the lower reaches of the creek are listed on the Washington State 303(d) list of impaired waters for elevated temperatures and fecal coliform levels, state water quality standards designate Issaquah Creek as Class A (excellent). Localized pollution from urban sources, roads, and agricultural and forestry activities likely contribute to the 303(d) listing of Issaquah Creek.

5.4. Geology/Sediments

The soils and land types of the King County Area were formed largely in deposits of glacial drift laid down during the Vashon period of the Fraser glaciation late in the Pleistocene. The major kinds of material left by the glacier are till, recessional outwash, and pro-glacial lacustrine and outwash sediments (Snyder *et al.* 1973).

Soils on the low terrace are mapped as Puyallup fine sandy loam, a soil series typical of alluvium and natural levees adjacent to streams. Soil borings indicate that the soils are characterized by about a 1-foot-deep layer of sandy silts overlying 1 to 5 feet of sandier soils. Below the sandy layers, deposits of clean gravels predominate. The water table generally corresponds to the gravel layers.

Gravels characterize the creek substrate, with occasional sand bars along the creek shoreline. No known sources of possible sediment contamination occur at or upstream of the project site.

5.5. Natural Resources

5.5.1. Fish

Anadromous fish found in Issaquah Creek include chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), sockeye salmon (*O. nerka*), and steelhead trout (*O. mykiss*). In recent years large numbers of chinook, coho, and sockeye salmon have returned to Issaquah Creek but only a small percentage of these salmonids have been documented upstream of the hatchery intake dam at RM 3.5. Resident fish in the creek include sculpin (*Cottus* spp.) and large numbers of cutthroat trout (*O. clarki*). There was an observation of a native char (*Salvelinus* sp.) in the creek years ago and a small native population of kokanee may inhabit the creek. Recent sampling by Washington Department of Fish and Wildlife did not capture any char or kokanee.

5.5.1.1. Chinook Salmon

Issaquah Creek is one of the three major chinook salmon spawning streams in the Lake Washington basin. It has been estimated that Issaquah Creek produced approximately 33% of all wild chinook salmon smolts entering the Lake Washington basin in 2000. Chinook salmon return to Issaquah Creek from July through October, with the peak in mid August through September. The collection of adult coho and chinook salmon for egg propagation takes place during the months of September, October, and at least part of November. The collection of broodstock during this period precludes chinook salmon and coho salmon escapement above the hatchery. Approximately 2,400 coho salmon and 1,200 chinook salmon are required to meet the hatchery's egg take goals of 3.3 million coho salmon and 2.425 million chinook salmon. During the collection period, essentially all salmonids other than chinook salmon and coho salmon are sorted out manually and released back into Issaquah Creek upstream of the hatchery weir.

During the rest of the year, approximately December through August, upstream-bound fish are allowed to pass over the hatchery weir. Therefore, any chinook salmon returning before or after the hatchery collection period would be able to move upstream of the hatchery and spawn naturally. Primary spawning areas include the East Fork of Issaquah Creek and the mainstem below the hatchery.

The majority of naturally-spawned chinook salmon production in the basin is likely due to the progeny of hatchery-spawned fish. The hatchery's production goal requires approximately 1,200 adult chinook salmon for egg production and the escapement goal is 500 fish. In some years, the escapement goal is not met, but recent returns have been well sufficient to meet both the hatchery and escapement thresholds. Adult returns between 1994 and 2001 ranged between 1,246 and 10,451 fish. The Washington Department of Fish and Wildlife (WDFW) estimates that Issaquah Creek produced between 39,000 and 45,000 juvenile chinook salmon in 2000.

Issaquah Creek chinook salmon exhibit an "ocean-type" life history. In general, ocean-type fish tend to move relatively rapidly through freshwater and into coastal or estuarine rearing areas as juveniles. Like most chinook salmon in the Lake Washington basin, Issaquah Creek chinook salmon emigrate from their natal streams as fry from early January through March. Most juvenile fish then rear in Lake Washington for several months moving into Puget Sound in May and June. Recent evidence also suggests evidence that some chinook salmon may rear in Lakes Sammamish and Washington for a year or more prior to outmigration.

5.5.1.2. Coho Salmon

Adult coho salmon return and migrate upstream from early September through late December and juvenile coho salmon migrate downstream in mid March through May in Issaquah Creek. Coho salmon are also propagated at the Issaquah hatchery so there is a hatchery component and a wild component to the Issaquah Creek coho salmon population. Adult coho salmon returning to Issaquah Creek are collected during the months of September, October, and part of November. Generally the procedure has been to collect approximately 2,400 coho salmon for egg propagation and allow 1,300 to 2,400 coho salmon above the rack to spawn naturally. The coho salmon escapement goals for Issaquah Creek and other Puget Sound streams have been determined by WDFW by various methods through the years resulting in varying escapement goals depending on the methods used. King County Surface Water Management has suggested that enough usable habitat is available in Issaquah Creek and its tributaries upstream of the hatchery to justify allowing 6,000 to 10,000 adult coho salmon to pass upstream of the hatchery every year. In addition, if nutrients are limiting coho production, allowing larger numbers of fish upstream of the hatchery to spawn may increase the carrying capacity of the stream as the decaying carcasses provide needed nutrients.

Trapping of juvenile coho salmon was conducted in the spring of 2000 from March 14 through July 3 to estimate natural coho salmon production of Issaquah Creek. In 2000, WDFW estimated that Issaquah Creek produced 18,232 wild coho salmon (Seiler, pers. comm.).

5.5.1.3. Sockeye Salmon

It has been estimated that 80% of the Lake Washington sockeye salmon spawn in the lower Cedar River, with the remaining 20% spawning primarily in Bear Creek and Issaquah Creek.

The 1992 Washington State Salmon and Steelhead Inventory (WDF *et al.* 1993) identified three distinct sockeye salmon stocks in Lake Washington, with the Issaquah Creek sockeye salmon as a part of the Sammamish Tributary Stock. Historic run sizes (1972-1990) for Issaquah Creek in particular are not available but the entire Lake population had a median of 246,913 adults, ranging from 122,964 in 1990 to 531,062 in 1988. From 1988 to 1995 the population continually declined with the lowest run on record in 1995, with 23,997 adults returning. However, in 1996, 2000, and 2002, large numbers of sockeye salmon returned, suggesting that the long-term negative escapement trend is reversing. Adult sockeye salmon return to Issaquah Creek from August to November with peak returns in September and October. Juvenile sockeye salmon migrate downstream from January through April.

5.5.1.4. Kokanee

Native kokanee were historically widespread throughout Lake Washington and its tributaries (Bean 1891). From 1978 to 1998, the native early-run-timing kokanee stock was found largely in Issaquah Creek and is believed to be the only remaining native stock of kokanee present in the Lake Washington Basin (Pfeifer 1995). Historically, this stock was present in at least Swamp and Bear Creeks. During the 1930's and 1940's, the Washington Department of Game took up to 10 million eggs from kokanee that were trapped in Bear Creek. An egg take of this size suggest trapping of in excess of 10,000 adults and as high as 25,000. However, the annual escapement rates into Issaquah Creek were reported to vary between one and three thousand individual spawners during the early 1970's (Berggren 1974). From 1980 through 1982, estimated kokanee escapement into Issaquah Creek ranged from approximately 400 and 1,000 fish (Pfeifer 1992). In 1983, only 10 early run kokanee were observed in Issaquah Creek. Kokanee escapement counts conducted from 1992 through 1998 showed a continual low escapement.

The decline of the Issaquah Creek kokanee is most likely due to their spawning timing. These fish spawn in July and August, subjecting their redds to the typical low flow period that is accompanied by warm water temperatures. In addition, sockeye, chinook, and coho salmon would potentially construct their redds in the same locations as the kokanee redds that were constructed just a few weeks earlier. Presently, the hatchery intake dam essentially blocks kokanee migration to upstream areas, including the creek reach adjacent to the Squak Valley parcel, in part due to low flows during the kokanee spawning migration (Parametrix, 2002). In 2001 and 2002, the WDFW operated a weir on Issaquah Creek to trap kokanee in July and August, but no kokanee were caught (Uehara, J., 16 Jul. 2003 memo to Lake Sammamish Kokanee Technical Committee). This evidence suggests that early-run kokanee no longer exist in Issaquah Creek, although populations may persist in other portions of the Lake Sammamish basin.

5.5.1.5. Steelhead Trout

Steelhead trout, displaying perhaps the most diverse life history pattern of all Pacific salmonids, reside in most Puget Sound streams. Within these groups, steelhead trout are further divided based on the state of sexual maturity when they enter freshwater. Stream-maturing steelhead trout (also called summer steelhead trout) enter freshwater in an immature life stage, while ocean-maturing (or winter steelhead trout) enter freshwater with well developed sexual organs (Busby *et al.* 1996). Steelhead trout in the Lake Washington basin are winter steelhead trout that

spawn from February through May. Juvenile steelhead trout migrate in April and May. Much like chinook and coho salmon, the steelhead trout population is composed of hatchery and wild fish. In 1998, fry were planted in the upper river and the Issaquah hatchery also raises steelhead trout that are released as fingerlings. In recent years, only a couple of adult steelhead trout return to Issaquah Creek each spring. In 2000, the juvenile sampling with a screw trap estimated that a total of 1,146 wild steelhead trout smolts migrated past the trap. However, no attempts were made to adjust this number to represent the total basin production.

5.5.1.6. Coastal Cutthroat Trout

Coastal, or anadromous cutthroat trout, are distributed in coastal watersheds along the entire Pacific Coast north of the Eel River in northern California. Coastal cutthroat trout exhibit early life history characteristics similar to coho salmon and steelhead trout whereby juveniles spend time rearing in freshwater before outmigrating as smolts (Leider 1997). Little information is available on the status of coastal cutthroat trout in Issaquah Creek. It is known that the adult cutthroat return to Issaquah creek in February through April, and the juveniles migrate downstream in February through June. Lake Washington cutthroat spawn in tributaries and appear to spend their entire life in Lake Washington rather than migrating into the Puget Sound. Over 4 years of purse-seining in Lake Union and the Chittenden Locks, thousands of sockeye salmon, coho, and chinook salmon have been captured but only a few cutthroat have been observed. Trapping of outmigrating fish was conducted in the spring of 2000 from March 14 through July 3 to estimate the wild coho salmon production of Issaquah Creek. In addition to obtaining coho salmon production, information on cutthroat trout was obtained. It was estimated that 14,803 cutthroat migrated past the trap during the sample period. However, no attempts were made to adjust this number to represent the total basin production.

5.5.1.7. Bull Trout

The only likely viable bull trout subpopulation in the Lake Washington watershed is the Chester Morse Reservoir subpopulation. However, the Chester Morse Reservoir subpopulation is above an anadromous barrier and is a glacial relic population (WDFW 1998). Only two ``native char'' were observed between 1989 and 1999 in the Issaquah Creek drainage and none have been observed in the Sammamish River system, which are occupied by the Sammamish River-Issaquah Creek subpopulation. It is questionable whether a viable subpopulation remains. Urbanization, road building and associated poor water quality have negatively affected habitat in the Sammamish River and Issaquah Creek drainages (USFWS 1999). There is no known spawning subpopulation resident in Lake Washington or Lake Sammamish; however, bull trout have been observed in the fish ladder viewing pool at the Chittenden Locks as recently as 1997 (F. Goetz, USACE, pers. comm.) and isolated reports of bull trout captures in or around Lake Washington occur every few years. A larger juvenile bull trout (~250 mm, 3 year old) was caught in the lower Cedar River in July of 1998 (USACE 2001).

5.5.2. Wildlife

Wildlife in the basin include over 100 species of birds, including bald eagles (*Haliaeetus leucocephalus*), barred owls (*Strix varia*), northern saw-whet owls (*Aegolius acaducus*), red-tailed hawks (*Buteo jamaicensus*), pileated woodpeckers (*Dryocopus pileatus*), and blue grouse (*Dendragapus obscurus*). In addition, dippers (*Cinclus mexicanus*) and belted kingfishers (*Ceryle alcyon*) have been observed throughout the basin. Several species of amphibians and

reptiles are found in the area including the rubber boa (*Charina bottae*) and the Pacific giant salamander (*Dicamptodon ensatus*). Large mammals in the project area include black-tailed deer (*Odocoileus hemionus columbianus*), black bear (*Ursus americanus*), coyote (*Canis latrans*), bobcat (*Felis rufus*), beaver (*Castor canadensis*), river otter (*Lutra canadensis*), and the occasional elk (*Cervus elephus*). Historically, cougar (*Felis concolor*) were common in the area but presently they are known only to inhabit the North Fork Issaquah Creek basin and area of Tiger Mountain (Parametrix 2002).

5.5.3. Sensitive, Threatened and Endangered Species.

In accordance with Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended, federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed and proposed threatened or endangered species. Three species protected under the Act are potentially found in the project area (**Table 1**). Information on the life histories and occurrence of these species in the project area will be detailed in the Biological Evaluation (BE) prepared for the proposed project. This document is briefly summarized in Section 5.5.3 and, at completion of the Section 7 consultation with the USFWS and NOAA Fisheries, will be available online at <http://www.nws.usace.army.mil/ers/envirdocs.html>.

Table 1. ESA Protected Species Potentially Occurring in the Project Vicinity

Species	**Listing Status**	**Critical Habitat**
Bald Eagle *Haliaeetus leucocephalus*	Threatened	N
Coastal/Puget Sound Bull Trout *Salvelinus confluentus*	Threatened	N
Puget Sound Chinook Salmon *Oncorhynchus tshawytscha*	Threatened	N
Puget Sound/Strait of Georgia Coho Salmon *Oncorhynchus kisutch*	Candidate	N/A

5.5.4. Vegetation

The vegetation in the lower reaches of the Issaquah Creek basin is generally comprised of a mixed coniferous forest on the valley slopes and mixed deciduous forest in the valley floor. At the proposed project site, the riparian areas along Issaquah Creek are characterized by a canopy of alder (*Alnus rubra*), cottonwood (*Populus trichocarpa*), and a few small red cedars (*Thuja* plicata). The understory in the riparian area of Issaquah Creek consists of salmonberry (*Rubus spectabilis*), snowberry (*Symphoricarpos albus*), Indian plum (*Oemleria cerasiformis*), swordfern (*Polystichum munitum*), Oregon grape (*Berberis aquifolium*), and Himalayan blackberry (*Rubus discolor*). Willows (*Salix* spp.) dominate areas adjacent to Tributary 0199 near Issaquah-Hobart Road, with blackberry bushes forming a complete canopy over the tributary for most of its remaining length until its confluence with Issaquah Creek.

The majority of the project site is an open field that are dominated by a variety of pasture grasses such as Kentucky bluegrass (*Poa pratens*), bentgrass (*Agrostis* sp.), fescue (*Festuca* spp.), reed

canarygrass (*Phalaris arundinacea*). At the north end of the pasture, giant horsetail (*Equisetum telmatiea*) occurs. The steep slope between the field and the higher terrace at the southeastern corner of the property is covered with blackberry.

The proposed disposal area is primarily pasture composed of similar grasses to those found at project site. Seven conifers and 5 deciduous trees are located within the disposal area. Eleven of these trees are associated with the existing residence that would be removed prior to the project.

5.5.5. Wetlands

A wetland delineation of the Squak Valley parcel and the proposed disposal site was performed in early April, 2002 (The Watershed Company, 2002). The delineation was accomplished using the *Washington State Wetlands Identification and Delineation Manual* (Washington Dept. of Ecology, 1997). Three wetland areas each were delineated on the Squak Valley parcel and the parcel proposed for disposal of excavated material.

The largest wetland at the Squak Valley parcel, a complex of emergent and scrub-shrub communities, occupies two parallel north-south swales that are connected in the center. The eastern swale, which includes two remnant ponds, lies at the base of the steep terrace slope. Seeps from the slope feed the eastern part of the wetland. The western swale occupies a relic meander scar and is likely supported by a seasonally high water table. The other two wetlands at the project site; one emergent, one scrub-shrub; occur in small low-lying pockets that also are likely dependent on a seasonally high water table for hydrological support.

The disposal parcel contains three wetland systems, two of which are located on the low terrace adjacent to Issaquah Creek and well outside of the proposed disposal area. The third wetland system occurs a portion of the upper terrace just west of the existing residence. This wetland is an emergent seep system that drains westward toward the creek.

5.6. Native American and Cultural Resources Sites

No Native American or cultural Resources sites occur in the project area. Native Americans do harvest salmonids from the Lake Washington-Sammamish system, including those that originate from the Issaquah Creek basin.

5.7. Hazardous Materials

Both the Squak Valley and proposed disposal site currently have single-family residences. Prior to commencement of construction of the Federal project, the City of Issaquah will remove all structures, including several underground storage tanks (gas and oil) near the residences. The houses may also contain lead paint or asbestos and both will need to be evaluated and, if necessary, abated before demolition. During demolition, outside debris will also be removed. The City of Issaquah is responsible for coordination of all study, removal, or abatement of hazardous materials prior to construction of the habitat restoration project.

5.8. Land Use

Data from 1995 indicates that more than 75 percent of the Issaquah Creek basin was forested, with the remainder in wetlands, pastures, urban (less than 10 percent), and cleared areas (Kerwin 2001). Currently, 30 percent of the basin is zoned commercial forest production, 12 percent is

within the urban growth boundary, and the remaining in rural zoning (58 percent). Over 40 percent of the lands are in public ownership. Population increases in the basin and resultant pressure to develop rural lands are expected to continue. The population of the Issaquah Creek Basin is projected to increase by 18 percent between the year 2000 and 2020 (Kerwin 2001).

Upstream of the Squak Valley parcel, areas of pasture and low-density residential development concentrate close to the main creek channel. From the project vicinity to its mouth, Issaquah Creek is increasingly hemmed in by development and has been extensively altered by human activity.

Within about 1 mile of the project site in either direction along Issaquah-Hobart Road, residential parcels mix with multi-family housing, public park areas, and sites used for church or commercial purposes. Downstream from the Squak Valley parcel, the City of Issaquah surrounds the creek, with a narrow riparian corridor bordered by residential and commercial development. A state fish hatchery at RM 3.0 maintains a collection weir and associated fish ladder at the hatchery and another weir at the hatchery's water intake at about RM 3.5, which is a partial barrier to upstream fish passage. Between about RM 0.6 to Lake Sammamish, the creek winds through Lake Sammamish State Park where the stream is wide, deep, and slow moving.

Both the Squak Valley parcel and the proposed disposal parcel are currently owned by the City but used for single-family residences in the existing houses. In the past, the lower terrace was likely used as a pasture or hay field, as evidenced by the barn near the house in the southeast portion of the site.

5.9. Flood Hazards

The existing levee at the Squak Valley site would be overtopped during a 50-year flood event and backwater flooding up Tributary 0199 likely occurs during more frequent high-flow events. For example, a substantial portion of the lower terrace was inundated during high winter flows in the late 1990's. The upper terraces at the park site and the proposed disposal site are well above the 500-year floodplain.

5.10. Recreation

While the City plans to develop the Squak Valley parcel and the proposed disposal area as recreational areas in the future, recreational opportunities currently associated with the parcels are extremely limited. Issaquah-Hobart Road carries a large amount of traffic, particularly during morning and evening rush hours and currently there is no public access to either site. Additionally, there is limited public access to the creek in the project vicinity. Shoreline property owners may utilize the creek corridor for recreational activities such as birdwatching and fishing.

6. EFFECTS OF THE PROPOSED ACTION

6.1. Physical Characteristics

The proposed project would change the character of the Squak Valley parcel site from a floodplain terrace by creating backwater channel aquatic habitat that is currently not present at or near the site. The topography of the site would be altered with the excavation of the two

backwater channels. The shoreline of Issaquah Creek would be altered with the excavation of the existing right-bank levee for the two side-channel inlets. These inlets have been carefully designed to minimize impacts to the creek channel and shoreline by incorporating bioengineered stabilization of disturbed areas and a final geometry that minimizes scour and erosion. At the disposal site, placement of excavated material would elevate the land surface by 8 feet or less (see Figure A-10).

6.2. Hydrology and Hydraulics

The proposed project will alter the shoreline of Issaquah Creek and Tributary 0199. Timing and durations of flows in both waterbodies will not be affected by the proposed project. The project may slightly affect hydraulic conditions in the vicinity of the side-channel outlets. To minimize hydraulic impacts, the outlets have been designed to minimize the change to the creek channel cross-sectional area with the placement of several large boulders on the upstream side of each outlet. Additionally, disturbed shorelines areas of Issaquah Creek will be stabilized using bioengineering techniques designed to withstand the 50-year flow conditions. Tributary 0199 work will be limited to sloping the banks of the tributary to a shallower slope and will have minimal effect on its hydraulics.

The backwater channels are designed to contain water under all but the driest conditions, with the water source a combination of backwater from Issaquah Creek and, during most of the year, groundwater inflow. The channel bottom will be between 4 and 7 feet below the existing ground surface. Test pits dug in March 2000 found a water table depth at about 4.5 feet below the existing ground, indicating that the proposed channels will intersect the water table during the spring and winter. The channel will be shallowly sloped to allow the creek to backwater past the proposed pools during all creek flows. Since the channel is sloped, the benches at the distal ends both backwater channels will be shallowly inundated during average creek flows, allowing formation of an emergent wetland.

6.3. Water Quality

During construction, the primary potential water quality impact will be increased turbidity. To minimize introduction of fine sediment into Issaquah Creek, Tributary 0199, or wetlands outside of the project area, the project will apply best management practices to control sediment and erosion. The limits of construction disturbance will be minimized and clearly marked prior to the start of land-disturbing activities. Silt fences will be installed as necessary to isolate construction areas from waterbodies and wetlands. Construction personnel will inspect erosion and sediment control features at least every other day during dry weather and during and after any rain events. Any observed deficiencies would be immediately corrected. Placement of excavated material at the disposal site will provide a minimum 50-foot buffer from wetland boundaries.

To minimize potential spills and leaks of petroleum and hydraulic fluids during construction, construction equipment would be inspected daily for leaks or petroleum contamination. A spill prevention control and containment plan designed to reduce the impacts from potential spills (fuel, hydraulic fluid, etc) will be in place prior to the start of construction. No mechanized equipment will enter Issaquah Creek, Tributary 0199, or wetlands that are outside of delineated construction limits.

With the exception of the outlets for backwater channel outlets, the project will be constructed without any in-water work. Accordingly, Issaquah Creek water quality will not be impacted during the clearing/grading and excavation work elements related to channel construction. Excavation of the creek shoreline will occur after final grading of the more landward portions of the backwater channels. All in-water work will occur during the standard construction window for Issaquah Creek of June 15 to July 31 (which corresponds to the standard work window typically required by WDFW for Issaquah Creek).

After construction, the primary water quality impact will likely be increased water temperature. The new backwater channels will increase the water surface area and, until trees and shrubs planted along the channels grow to provide sufficient shade, water temperatures in the backwater channels during the summer months may increase above the temperature of Issaquah Creek (although this may be moderated by input of groundwater). Adverse effects to Issaquah Creek water temperatures are unlikely since exchange between the creek and the backwater channels will likely be minimal during the summer. Within five years, planted willows will likely be large enough to provide sufficient change to minimize temperature increases during the summer. Accordingly, while the water quality in the backwater channels may be adversely affected by elevated water temperatures for several summers after construction, long-term adverse effects due to high water temperatures in the channels are not anticipated.

6.4. Geology/Sediments

The proposed project will excavate about 12,000 cubic yards of material from the new backwater channels and the riparian area along a portion of Tributary 0199 (additional excavation and grading will occur for construction of the parking lot, trail, and approaches to the footbridge over Tributary 0199). In the backwater channels, the excavation will expose soils with more sand and gravel than that currently present on the existing land surface. Additional gravel will be imported to provide a gravel bottom to the backwater channel where the native substrate is gravel-poor. The shoreline substrate of Tributary 0199 will not change but will be sloped at a shallower angle than presently exists.

With a portion of the excavated material, a low berm will be constructed on uplands between Tributary 0199 and the northern backwater channel. This berm is intended to ensure that Issaquah-Hobart Road is not flooded when high creek flows inundate the project site through the side-channel outlets. This berm will raise ground elevations between 1 and 3 feet.

Remaining excavated material will be placed at the disposal site, rough-graded, and stabilized in accordance to best management practices. Although the land surface will be higher after placement of the excavated material, the substrate characteristics will be very similar to pre-disposal conditions. The city of Issaquah plans future construction of playfields at the disposal site, actions that they are pursuing separate from the proposed habitat restoration project.

6.5. Natural Resources

6.5.1. Fish

Coho salmon and cutthroat trout will likely utilize the new backwater channels more often and with greater abundance than other salmonid species. The channels will create low velocity

habitat with abundant large woody debris that is preferred by rearing juvenile coho salmon. Cutthroat trout, particularly juvenile and small adult fish, also exploit these off-channel habitats. Rearing juvenile coho salmon prefer slack-water habitats at the margins of streams and coho salmon abundance in a stream has been linked to the number of suitable territories that are available (Larkin, 1977). Additionally, spring freshets can displace rearing coho salmon by sweeping coho salmon from their established territory, where, in most cases, the displaced fish involuntarily move to less favorable sites (Groot and Margolis, 1998). Coho salmon will also use the backwater channels as overwintering habitat, including portions of the channel that may be wetted only during the wetter parts of the year. The proposed backwater channels will increase the quality and quantity habitat available for rearing coho salmon juveniles while minimizing the chance of displacement from high flows.

Benefits to chinook salmon and steelhead trout are expected as juveniles of these species utilize the channels for rearing and refuge during high-flow events during the late winter and spring. Chinook salmon, in particular, are expected to utilize the backwater channel habitat primarily in the later winter and early spring shortly after emergence when the chinook salmon fry show preferences for habitats characterized by slow water velocities and sand and silt substrates (Lister and Genoe, 1970). As chinook salmon grow, they typically move to areas with larger substrates and increasing water velocities, such as the Issaquah Creek channel along the Squak Valley site. Accordingly, the diversity of flow, substrate, and depth that will be provided at the outlets of the channels will likely provide important habitat for juvenile chinook salmon later in the spring. Sockeye salmon typically migrate from their natal stream soon after emergence and do not utilize off-channel stream habitats.

As discussed in Section 5.2, Issaquah Creek is a very “flashy” system, meaning that flows rapidly increase during storm events and then rapidly fall off once the storm passes. Currently, fish, including salmonids, find little refuge from these high flow events since the Issaquah Creek channel lacks complexity and off-channel areas. The proposed project will re-connect Issaquah Creek to its floodplain at the project site and will allow resident fish to move into a low-velocity refuge area, particularly during high flooding flows. The backwater channels will increase diversity of habitat types in the Issaquah Creek basin and will facilitate inputs of litter and forage material from adjacent terrestrial areas, to the benefit of all resident fish species. Accordingly, the proposed project is expected to enhance survival and abundance of fish, including salmonids, in the Issaquah Creek system.

6.5.2. Wildlife

The proposed project will enhance wildlife habitat on the project site. Native plantings will provide forage and cover for birds, mammals, reptiles, and amphibians. The project will enhance the Issaquah Creek corridor and opportunities for movement of wildlife species along the creek. Prior to canopy closure over the back channels, waterfowl habitat will be provided. After several years, habitat will be more suitable for passerines, raptors, owls, and woodpeckers. Mammals such as raccoons, deer, otters, and coyote will continue to utilize the site, possibly in greater numbers and/or more frequently than before the project.

The walking path along the edge of the habitat restoration area will provide easy public access to the site. However, considering the proximity to busy Issaquah-Hobart Road and the likelihood that use of the path is likely to be sporadic, the potential for disturbance to wildlife from path

users should be minimal. Plantings will buffer the backwater channels from the activities on the more accessible portions of the site.

6.5.3. Sensitive, Threatened and Endangered Species.

Potential impacts of the proposed project on sensitive, threatened and endangered species are summarized below and will be addressed in detail in a separate BE. The effects discussed below will be further considered through consultation with the USFWS and NOAA Fisheries in accordance with Section 7(a)(2) of the Endangered Species Act (see Section 9.2).

No bald eagle nests occur within one mile of the project or disposal site (Washington Priority Habitat and Species List Database, July 2003). Bald eagles likely use or occur near the project area only sporadically. Bald eagles are more active and abundant in areas closer to Lake Sammamish, more than four miles north of the project site. Bald eagle use of the site is most likely during the winter in association with the salmon spawning period. Construction at the site will occur during the spring and summer months, minimizing the chance of impacts to bald eagles. After construction, the habitat restoration will provide similar eagle habitat to that which currently exists. Accordingly, the proposed project is not likely to adversely affect bald eagles.

Effects on fish, including salmonids, are discussed in detail in Section 6.5.1. Construction will be planned and manage to minimize potential impacts to salmonids and other aquatic species. All in-water work will occur from June 15 to July 31, the standard WDFW work window for Issaquah Creek that is designed primarily for protection of salmonids. Bull trout are unlikely to occur in Issaquah Creek during the summer as the water temperature increases. Seasonal abundance of chinook and coho salmon adults and juveniles is the lowest of the year during the standard construction window. Considering the magnitude, timing, and management of construction of the project, the likelihood of impacts to bull trout and chinook salmon during construction are insignificant and discountable. After construction, habitat for salmonids, including chinook salmon, coho salmon, and bull trout, will be enhanced by the creation of the backwater channel habitat. Accordingly, the project is not likely to adversely affect Puget Sound/Coastal bull trout or Puget Sound chinook salmon. Under ESA, effect determinations are not appropriate for candidate species such as Puget Sound/Strait of Georgia coho salmon.

6.5.4. Vegetation

Extensive plantings are planned for the proposed project. As a result, vegetation at the project site would change from pasture (consisting primarily of introduced herbaceous species) to a native forest/scrub-shrub community. Existing forested areas adjacent to the construction areas would not be disturbed with the exception of the levee breaches necessary to connect the backwater channels to Issaquah Creek. Wherever possible, the levee breaches will be constructed to avoid removal of trees. The parking area at the project site will result in removal of some small trees.

Along Tributary 0199, blackberries would be removed in the course of sloping the creek banks to a shallower angle, followed by planting of native riparian species.

At the disposal site, the existing pasture will be buried under the material excavated from the Squak Valley Park site, which will then be hydroseeded. Several trees will be removed at the

disposal site near the location of the current residential structure. Conifers meeting specifications for large woody debris will be recycled for placement in the backwater channels at the habitat restoration site.

6.5.5. Wetlands

Table 2 details the wetland impact and wetland creation acreages for the proposed project. The proposed project will enhance and restore the riparian habitat, including wetlands, of Issaquah Creek. Three wetland bench areas; total area of 4,400 square feet (0.10 of an acre); will be provided along each backwater channel. These wetland areas will be directly connected to the backwater channels, providing increased diversity and ecological functions to backwater channel aquatic habitat. For example, the benches will provide refuge for fish during high water events and nutrient and food input to the backwater channels. The upper reaches of the backwater channels themselves may also assume some wetland characteristics, particularly during drier periods of the year. Compared to the existing pasture wetlands, the wetland to be created by the proposed work will be more diverse and higher quality.

Wetland impacts from the proposed trail and berm are expected to be minor. The trail crossing of the wetland will consist of a gravel path that is laid at the existing ground surface, thereby providing connectivity between the backwater channels and the undisturbed wetlands east of the trail. This connection is particularly important during flood events, although maintenance access may be impeded when the trail is flooded at this location. The berm will fill 34 square feet of wetland that occupies the shallow swale along Issaquah-Hobart Road.

Table 2. Wetland Impact and Creation Acreage

	Wetland Impact (sq. ft.)	Wetland Creation (sq. ft.)
Flood Control Berm	34	
Trail/Access Road*****	123	
South Backwater Channel	5,144	
Construction Access Road	*273 (temporary)*	
Construction Activities	*1,600 (temporary)*	
North Channel Sedge Benches		2,213
South Channel Sedge Benches		2,187
North Channel Wetted Area		6,987
South Channel Wetted Area		6,785
SUBTOTALS	5,301 (permanent)*****	4,400 (sedge benches)
	1,873 (temporary)	13,752 (wetted area)
TOTAL	7,174 (0.16 acre)	18,152 (0.42 acre)

6.6. Native American and Cultural Resources Sites

The proposed project will have no effect on Native American and cultural resource sites since no such resources occur in the project area. Coordination necessary to verify this conclusion will be completed with the Washington State Office of Historic Preservation prior to construction. The work would not adversely affect salmonid populations or impair fishing sites reserved by treaties for Native American use. If construction encounters any cultural archaeological resources, work

in the area would immediately cease and would not resume until appropriate coordination with agency and/or tribal representatives is completed.

6.7. Hazardous Materials

The City of Issaquah will remove all known hazardous materials from the project areas prior to commencement of the Federal project. Accordingly, hazardous materials are not expected to be encountered in or near the project area as part of the Corps project. To minimize the likelihood potential spills and leaks of petroleum and hydraulic fluids during project construction, construction equipment will be inspected daily for leaks and petroleum contamination. Additionally, a spill prevention control and containment plan designed to reduce impacts from spills (fuel, hydraulic fluid, etc.) will be in place prior to the start of construction. Finally, the project will not introduce any hazardous materials to the project areas.

6.8. Land Use

The proposed project will alter the land use from rural residential to public park and habitat restoration area. The site will represent one of relatively few areas in the city of Issaquah to provide an extensive and diverse riparian area along and associated with Issaquah Creek.

6.9. Flood Hazards

The proposed project will remove sections of the existing levee at the project site and result in more frequent flooding of the restoration areas. The project will not affect the water surface elevation of the 100-year flood. The proposed berm at the southern end of the project site will ensure that Issaquah-Hobart Road is not adversely affected by flooding, providing assurances to local stakeholders who may be concerned that the project will exacerbate flooding.

6.10. Recreation

With the inclusion of features such as a parking area, gravel path, benches, and gazebo, the proposed project will enhance recreational opportunities. Currently, public use of the project site is extremely limited, in part because the public ownership of the property is not apparent. The proposed work will provide public access to the edges of the habitat restoration area. To minimize encroachment and disturbance to the habitat restoration areas, the proposed trail is located at the edge of the stream buffer. Recreational opportunities will include walking and bird watching.

7. CUMULATIVE EFFECTS

The NEPA defines cumulative effects as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions in the project vicinity, regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR §1508.7). According to Washington State Environmental Policy Act Register (http://www.ecy.wa.gov/apps/sepa/) and Corps records, a number of projects are ongoing or planned to occur along Issaquah Creek.

Two projects (Issaquah Creek Bank Stabilization/Habitat Enhancement Project and Gilman Area Channel Improvement Project), both located within ¾-mile upstream of I-90 and about 3.5 stream miles downstream of the Squak Valley parcel, are planned to plant willows and place

large woody debris along the shoreline. Another streambank restoration project (the Lasley Streambank Restoration Project) is planned to occur approximately 3 stream miles upstream of the Squak Valley parcel. These projects will enhance the riparian zone of Issaquah Creek and will complement the proposed work at the Squak Valley parcel.

Construction work by the Washington Department of Transportation (WDOT) is ongoing on a new Sunset Way interchange on I-90 adjacent to the East Fork of Issaquah Creek on the east side of the city. This work included authorization to fill wetlands and restore and enhance the creek corridor. In the summer of 2002, routine inspections by Corps Regulatory staff determined that additional unauthorized work had occurred. The unauthorized work included placement of riprap bank protection along the creek and additional wetland fill. To resolve the permit violation, the Corps is working with WDOT to restore the creek and perform additional compensatory mitigation. Together with the proposed Squak Valley project, restoration and mitigation work that will likely be performed in conjunction with the Sunset Way interchange will help restore lost ecosystem functions and values.

The Corps is currently in the planning stages of the Issaquah Fish Passage Project, a joint effort between the Washington Department of Fish and Wildlife and the U.S. Army Corps of Engineers. The project goal is to provide more efficient and effective adult and juvenile fish passage at the Issaquah Creek intake dam to improve spawning success of salmonids and reduce the mortality of juvenile and adult fish. When completed, this project would supplement the benefits expected to accrue from proposed Squak Valley project by providing for better access to the enhanced and restored off-channel habitat at Squak Valley site, as well as habitat that is available further upstream.

In summary, the cumulative impact of the Squak Valley project will be to incrementally enhance ecological functions and values, particularly with regard to salmonid habitat.

8. TREATY RIGHTS

In the mid-1850's, the United States entered into treaties with a number of Native American tribes in Washington. These treaties guaranteed the signatory tribes the right to "take fish at usual and accustomed grounds and stations . . . in common with all citizens of the territory" [*U.S. v. Washington*, 384 F.Supp. 312 at 332 (WDWA 1974)]. In *U.S. v. Washington*, 384 F.Supp. 312 at 343 - 344, the court also found that the Treaty tribes had the right to take up to 50 percent of the harvestable anadromous fish runs passing through those grounds, as needed to provide them with a moderate standard of living (Fair Share). Over the years, the courts have held that this right comprehends certain subsidiary rights, such as access to their "usual and accustomed" fishing grounds. More than *de minimis* impacts to access to usual and accustomed fishing area violates this treaty right [*Northwest Sea Farms v. Wynn*, F.Supp. 931 F.Supp. 1515 at 1522 (WDWA 1996)]. In *U.S. v. Washington*, 759 F.2d 1353 (9th Cir 1985) the court indicated that the obligation to prevent degradation of the fish habitat would be determined on a case-by-case basis. The Ninth Circuit has held that this right also encompasses the right to take shellfish [*U.S. v. Washington*, 135 F.3d 618 (9th Cir 1998)].

The proposed project has been analyzed with respect to its effects on the treaty rights described above. We anticipate that:

(1) The work will not interfere with access to usual and accustomed fishing grounds or with fishing activities or shellfish harvesting;

(2) The work will not cause the degradation of fish runs and habitat; and

(3) The work will not impair the Treaty tribes' ability to meet moderate living needs.

9. ENVIRONMENTAL COMPLIANCE

9.1. National Environmental Policy Act

Section 1500.1(c) and 1508.9(1) of the National Environmental Policy Act of 1969 (as amended) requires federal agencies to "provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact" on actions authorized, funded, or carried out by the federal government to insure such actions adequately address "environmental consequences, and take actions that protect, restore, and enhance the environment". This assessment evaluates environmental consequences from the proposed placement of substrate along the shoreline of Lincoln Park at Seattle, Washington.

9.2. Endangered Species Act

In accordance with Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended, federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed or proposed threatened or endangered species. The potential effects of the project and conservation measures taken to reduce those effects are summarized in Paragraph 5.5.3 and will be addressed in more detail in the BE for the project. The Corps will fulfill its responsibilities under the ESA prior to the start of project construction.

9.3. Clean Water Act Compliance

Nationwide Permit (NWP) 27 authorizes "activities in waters of the U.S. associated with the restoration of former waters, the enhancement of degraded tidal and non-tidal wetlands and riparian areas, the creation of tidal and non-tidal wetlands and riparian areas, and the restoration and enhancement of non-tidal streams and non-tidal open water areas…." The proposed project will result in a net gain in the functions and values at the project site and in the Issaquah Creek watershed by creating native riparian areas, providing refuge and rearing habitat for fish, and re-connecting Issaquah Creek to the adjacent floodplain. The proposed work meets the conditions of NWP 27 and the discharges and methods specified in the proposed work are therefore in accordance with the Section 404(b)(1) guidelines. Accordingly, the proposed work is consistent with guidelines pursuant to Section 404(b)(1) of the Clean Water Act.

In addition, consideration has been given to the need for the work, and to such water quality standards as are appropriate and applicable by law. For NWP 27, Water Quality Certification (WQC), pursuant to Section 401 of the Clean Water Act, has been partially denied without prejudice by the State of Washington (State). This means that NWP 27 projects may be required to obtain individual WQC if they exceed certain criteria. The Corps has reviewed these criteria and determined that the proposed Squak Valley project does not require an individual WQC because the project:

(1) Will impact less than ½ of an acre of waters of the United States;

(2) Will not likely cause or contribute to an exceedance of a State water quality standard (WAC 173-201A) or sediment quality standard (WAC 173-204);

(3) Will not cause or contribute to a discharge to a waterbody on the state's list of impaired waterbodies [i.e., the 303(d) list, for which Issaquah Creek is listed for fecal coliform and temperature] and the discharge will not result in further exceedances of a specific parameter for which the waterbody is listed;

(4) Will incorporate structures and modifications beneficial for fish and wildlife habitat.

9.4. Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA, 16 USC 470) requires that wildlife conservation receive equal consideration and be coordinated with other features of water resource development projects. This goal is accomplished through Corps funding of USFWS habitat surveys evaluating the likely impacts of proposed actions, which provide the basis for recommendations for avoiding or minimizing such impacts. The Corps has had some discussions with USFWS on the Squak Valley project and, prior to the start of project construction, the Corps will complete the appropriate FWCA coordination.

9.5. Essential Fish Habitat

In accordance with the Essential Fish Habitat (EFH) requirements of the Magnuson-Stevens Fishery Conservation and Management Act, the Corps has determined that the proposed work would impact approximately 180 linear feet of Issaquah Creek streambank (90 feet for each channel inlet) and about 105 linear feet of Tributary 0199, areas which are classified as EFH utilized by Pacific salmon. We have determined that the proposed action would not adversely affect EFH for federally managed fisheries in Washington waters. The project's BE will provide supporting documentation for our determination.

9.6. National Historic Preservation Act

The National Historic Preservation Act (16 USC 470) requires that the effects of proposed actions on sites, buildings, structures, or objects included or eligible for the National Register of Historic Places must be identified and evaluated. The project area does not include any sites listed in or eligible for the National Register of Historic Places.

9.7. Clean Air Act

The proposed project has been analyzed for conformity applicability pursuant to regulations implementing Section 176(c) of the Clean Air Act. The proposed activities would not exceed *de minimis* levels of direct emissions of a criteria pollutant or its precursors and are exempted by 40 CFR Part 93.153. Any later indirect emissions are generally not within the Corps continuing program responsibility and generally cannot be practicably controlled by the Corps. For these reasons, a conformity determination is not required for this project.

9.8. Environmental Justice

Executive Order 12898 directs federal agencies to identify and address disproportionately high and adverse human health or environmental effects of agency programs and activities on minority and low-income populations. No tribal resources would be harmed. No adverse effects

to minority or low-income populations would result from the implementation of the proposed project.

10. CONCLUSIONS

Based on the above analysis, this project is not a major Federal action significantly affecting the quality of the human or natural environment, and therefore does not require preparation of an environmental impact statement.

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APPENDIX A

Project Drawings

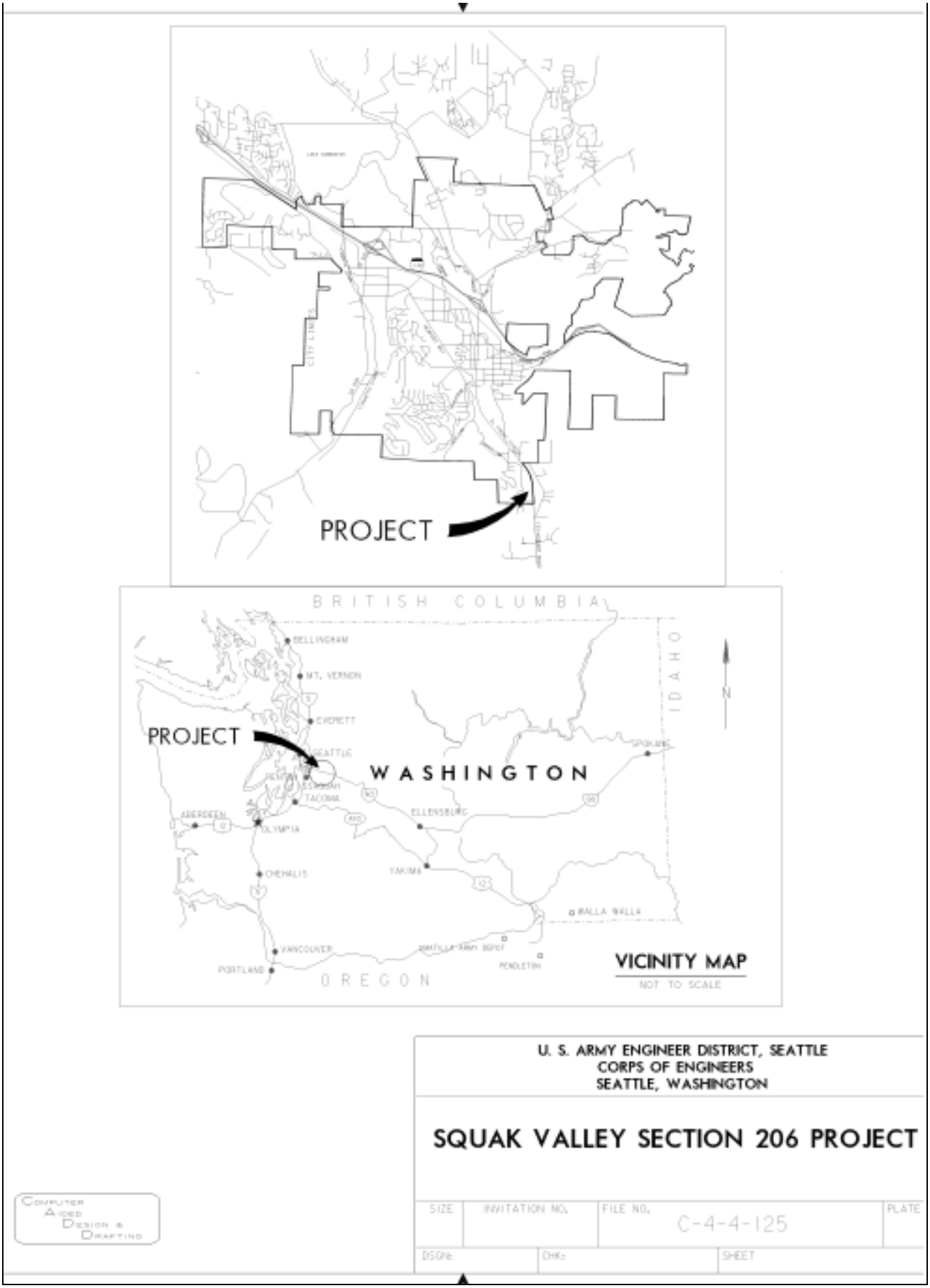

Figure A-1. Vicinity Map

TOTAL PLANT QUANTITIES FOR THE ENTIRE SITE

(TRIBUTARY 199, UPLAND PLANTINGS, AND BOTH CHANNELS)

QUANTITY	PLANT NAME	COMMON NAME	SIZE	SPACING
1069	CAREX OBNUPTA	SLOUGH SEDGE	4"	12"
1069	CAREX STIPATA	AWL-FRUITED SEDGE	4"	12"
1069	ELEOCHARIS SPP.	SPIKE RUSH	4"	12"
1069	OENANTHA SARMENTOSA	WATER PARSLEY	4"	12"
1833	SCIRPUS MICROCARPUS	BULRUSH	4"	12"
155	ACER CIRCINATUM	VINE MAPLE	3' HT.	10'
139	ACER MACROPHYLLUM	BIGLEAF MAPLE	4' HT.	12'
41	BETULA PAPYRIFERA	PAPER BIRCH	4' HT.	10'
21	CRATAEGUS DOUGLASII	DOUGLAS HAWTHORNE	3' HT.	10'
21	FRAXINUS LATIFOLIA	OREGON ASH	4' HT.	10'
21	MALUS SP.	PACIFIC CRABAPPLE	3' HT.	10'
155	PICEA SITCHENSIS	SITKA SPRUCE	3' HT.	12'
41	POPULUS TREMULOIDES	QUAKING ASPEN	3' HT.	10'
85	POPULUS TRICHOCARPA	BLACK COTTONWOOD	4' HT.	12'
139	PSEUDOTSUGA MENZIESII	DOUGLAS FIR	3' HT.	12'
21	RHAMNUS PUSHIANA	CASCARA	3' HT.	10'
480	SALIX LASIANDRA	PACIFIC WILLOW	¾" DIA. X 2'	1.5'
480	SALIX SITCHENSIS	SITKA WILLOW	¾" DIA. X 2'	1.5'
480	SALIX SCOULERIANA	SCOULER'S WILLOW	¾" DIA. X 2'	1.5'
202	THUJA PLICATA	WESTERN RED CEDAR	3' HT.	12'
670	CORNUS STOLONIFERA	RED OSIER DOGWOOD	1 GAL	4'
50	CORYLUS C. CALIFORNICA	WESTERN HAZELNUT	1 GAL	6'
116	GAULTHERIA SHALLON	SALAL	1 GAL	4'
279	HOLODISCUS DISCOLOR	OCEANSPRAY	1 GAL	5'
190	LONICERA INVOLUCRATA	BLACK TWINBERRY	1 GAL	4'
325	MAHONIA AQUIFOLIUM	TALL OREGON GRAPE	1 GAL	4'
441	PHILADELPHUS LEWISII	MOCK ORANGE	1 GAL	4'
116	PHYSIOCARPUS CAPITATUS	PACIFIC NINEBARK	1 GAL	4'
279	RIBES SANGUINEUM	RED FLOWERING CURRANT	1 GAL	5'
110	ROSA GYMNOCARPA	BALD-HIP ROSE	1 GAL	4'
110	ROSA NUTKANA	NOOTKA ROSE	1 GAL	4'
110	ROSA RUGOSA	RAMANAS ROSE	1 GAL	4'
116	RUBUS SPECTABILIS	SALMONBERRY	1 GAL	4'
51	SAMBUCUS RACEMOSA	RED ELDERBERRY	1 GAL	6'
190	SPIRAEA DOUGLASII	WESTERN SPIRAEA	1 GAL	4'
441	SYMPHIOCARPUS ALBUS	SNOWBERRY	1 GAL	4'
205	VACCINUM OVATUM	EVERGREEN HUCKLEBERRY	1 GAL	3'
190	VACCINUM PARVIFOLIUM	RED HUCKLEBERRY	1 GAL	4'

GENERAL NOTES:

1. BARK MULCH SHALL BE GROUND DOUGLAS FIR OR HEMLOCK BARK. SIZE SHALL BE 1-1/2 INCH MINUS.
2. TOPSOIL SHALL BE EXISTING SURFACE SOIL STRIPPED AND STOCKPILED FOR REUSE.
3. BACKFILL SOIL FOR THE PLANTING OF THE NATIVE TREES AND SHRUBS SHALL BE EXISTING EXCAVATED SOIL, IF ACCEPTABLE. WHERE UNACCEPTABLE SOIL EXISTS, THE BACKFILL SHALL CONSIST OF EXISTING EXCAVATED SOIL MIXED WITH COMPOST (25%).
4. UPLAND SHRUB PLANTING GROUP V SHALL RECEIVE A 3" DEPTH OF "GROCO" SOIL AMENDMENT. THIS AMENDMENT SHALL BE THOROUGHLY MIXED TO A DEPTH OF 12".
5. UPLAND SHRUB PLANTING GROUP V AND PARKING AREAS NOTES SHALL BE EVENLY MULCHED/ TOP-DRESSED WITH A 4" DEPTH OF BARK MULCH.
6. GROUPS I, II, III, AND IV, FOR THE CHANNEL, GROUP II AND IV FOR TRIBUTARY 199, UPLAND GROUP V (NON-SHRUB) AND ALL DISTURBED AREAS WILL BE HYDROSEEDED. DO NOT HYDROSEED GROUP V SHRUB AREAS.
7. PLATES L-1 THRU L-3 SHOW APPROXIMATE LOCATIONS OF TREES. FINAL LOCATIONS TO BE DETERMINED BY U.S. ARMY CORPS FIELD REPRESENTATIVE.
8. WILLOW PLANTINGS SHALL BE PLANTED AT 18" O.C. (2 ROWS), IMMEDIATELLY ABOVE EMERGENTS PLANTINGS AND ALONG ENTIRE LENGTH OF CHANNELS AND TRIBUTARY, BOTH SIDES. (CORNUS SHALL BE 1 GAL @ 18"O.C.)
9. EACH TREE AND SHRUB SHALL BE PIT PLANTED 2X THE DIAMETER OF THE ROOT BALL. TREES SHALL BE PLANTED IN GROUPS OF 3'S AND 5'S, SHRUBS AND CUTTINGS IN GROUPS OF 5-9, AND EMERGENTS IN GROUPS OF 15-25.
10. EACH PLANT PIT SHALL BE CONSTRUCTED WITH A WATER WELL TO PREVENT WATER FROM RUNNING AWAY FROM THE PLANT.
11. TREES SHALL BE PLACED TO COVER THE ENTIRE AREA SHOWN AT THE INDIVIDUAL SPACING GIVEN. CHANNEL SHRUBS SHALL BE PLANTED OVER THE SAME ENTIRE AREA AT THEIR RESPECTIVE SPACING. UPLAND SHRUBS SHALL BE PLANTED @ 4'O.C. IN GROUPINGS. SHRUB GROUPING AREAS SHALL BE ENTIRELY MULCHED. NO WORK IN EXISTING WETLAND AREAS.

TRIBUTARY 199 PLANT LIST

	PLANT NAME	COMMON NAME	QUANTITY
GROUP II			
NO SYMBOL	SALIX LASIANDRA	PACIFIC WILLOW	80
	SALIX SITCHENSIS	SITKA WILLOW	80
	SALIX SCOULERIANA	SCOULER'S WILLOW	80
	CORNUS STOLONIFERA	RED OSIER DOGWOOD	80
GROUP IV			
	ACER MACROPHYLLUM	BIGLEAF MAPLE	2
	CRATAEGUS DOUGLASII	DOUGLAS HAWTHORNE	3
	FRAXINUS LATIFOLIA	OREGON ASH	3
	MALUS SP.	PACIFIC CRABAPPLE	3
	PICEA SITCHENSIS	SITKA SPRUCE	8
	PSEUDOTSUGA MENZIESII	DOUGLAS FIR	2
	RHAMNUS PUSHIANA	CASCARA	3
	THUJA PLICATA	WESTERN RED CEDAR	2
	GAULTHERIA SHALLON	SALAL	16
	HOLODISCUS DISCOLOR	OCEANSPRAY	10
	PHILADELPHUS LEWISII	MOCK ORANGE	16
	PHYSIOCARPUS CAPITATUS	PACIFIC NINEBARK	16
	RIBES SANGUINEUM	RED FLOWERING CURRANT	10
	RUBUS SPECTABILIS	SALMONBERRY	16
	SAMBUCUS RACEMOSA	RED ELDERBERRY	7
	SYMPHIOCARPUS ALBUS	SNOWBERRY	16
	VACCINUM OVATUM	EVERGREEN HUCKLEBERRY	28

UPLAND PLANTINGS

UPLAND PLANTING SYMBOLS SHOWN BELOW ARE FOR GRAPHIC REPRESENTATION ONLY, REFER TO ACTUAL QUANTITIES LISTED IN THE UPLAND LEGEND FOR NUMBERS TO BE PLANTED.

UPLAND SYMBOLS (TREES)

ACER MACROPHYLLUM

CORYLUS C. CALIFORNICA

POPULUS TRICHOCARPA

PICEA SITCHENSIS

PSEUDOTSUGA MENZIESII

THUJA PLICATA

UPLAND LEGEND

	PLANT NAME	COMMON NAME	QUANTITY
SEE SYMBOLS	ACER CIRCINATUM	VINE MAPLE	155
	ACER MACROPHYLLUM	BIGLEAF MAPLE	125
	PICEA SITCHENSIS	SITKA SPRUCE	135
	POPULUS TRICHOCARPA	BLACK COTTONWOOD	85
	PSEUDOTSUGA MENZIESII	DOUGLAS FIR	125
	THUJA PLICATA	WESTERN RED CEDAR	165
	CORYLUS C. CALIFORNICA	WESTERN HAZELNUT	50
	HOLODISCUS DISCOLOR	OCEANSPRAY	205
	MAHONIA AQUIFOLIUM	TALL OREGON GRAPE	325
	PHILADELPHUS LEWISII	MOCK ORANGE	325
	RIBES SANGUINEUM	RED FLOWERING CURRANT	205
	ROSA GYMNOCARPA	BALD-HIP ROSE	110
	ROSA NUTKANA	NOOTKA ROSE	110
	ROSA RUGOSA	RAMANAS ROSE	110
	SYMPHIOCARPUS ALBUS	SNOWBERRY	325
	SCIRPUS MICROCARPUS	BULRUSH	764

SHRUB QUANTITIES OVER WHAT IS NEEDED FOR AREAS SHOWN ADJACENT THE TRAIL, SHALL BE PLANTED IN SIMILAR BLOCKS THROUGHOUT UPLAND PLANTING AREAS WITH THE MAJORITY OCCURING ADJACENT THE CHANNELS.

CHANNEL AREA PLANT LIST

	PLANT NAME	COMMON NAME	QUANTITY
GROUP I	CAREX OBNUPTA	SLOUGH SEDGE	1069
	CAREX STIPATA	AWL-FRUITED SEDGE	1069
	ELEOCHARIS SPP.	SPIKE RUSH	1069
	OENANTHA SARMENTOSA	WATER PARSLEY	1069
	SCIRPUS MICROCARPUS	BULRUSH	1069
GROUP II	SALIX LASIANDRA	PACIFIC WILLOW	400
NO SYMBOL SEE GENERAL NOTES	SALIX SITCHENSIS	SITKA WILLOW	400
	SALIX SCOULERIANA	SCOULER'S WILLOW	400
	CORNUS STOLONIFERA	RED OSIER DOGWOOD	400
GROUP III	BETULA PAPYRIFERA	PAPER BIRCH	41
	POPULUS TREMULOIDES	QUAKING ASPEN	41
	THUJA PLICATA	WESTERN RED CEDAR	28
	CORNUS STOLONIFERA	RED OSIER DOGWOOD	190
	LONICERA INVOLUCRATA	BLACK TWINBERRY	190
	SPIRAEA DOUGLASII	WESTERN SPIRAEA	190
	VACCINUM PARVIFOLIUM	RED HUCKLEBERRY	190
GROUP IV	ACER MACROPHYLLUM	BIGLEAF MAPLE	12
	CRATAEGUS DOUGLASII	DOUGLAS HAWTHORNE	18
	FRAXINUS LATIFOLIA	OREGON ASH	18
	MALUS SP.	PACIFIC CRABAPPLE	18
	PICEA SITCHENSIS	SITKA SPRUCE	12
	PSEUDOTSUGA MENZIESII	DOUGLAS FIR	12
	RHAMNUS PUSHIANA	CASCARA	18
	THUJA PLICATA	WESTERN RED CEDAR	12
	GAULTHERIA SHALLON	SALAL	100
	HOLODISCUS DISCOLOR	OCEANSPRAY	64
	PHILADELPHUS LEWISII	MOCK ORANGE	100
	PHYSIOCARPUS CAPITATUS	PACIFIC NINEBARK	100
	RIBES SANGUINEUM	RED FLOWERING CURRANT	64
	RUBUS SPECTABILIS	SALMONBERRY	100
	SAMBUCUS RACEMOSA	RED ELDERBERRY	44
	SYMPHIOCARPUS ALBUS	SNOWBERRY	100
	VACCINUM OVATUM	EVERGREEN HUCKLEBERRY	177

HYDROSEEDING NOTES:

HYDROSEED

HYDROSEED MIX SHALL BE AS FOLLOWS:

40% LONGFELLOW CHEWING FESCUE
30% TURF TYPE PERENNIAL RYEGRASS
10% CINDY CREEPING RED FESCUE
10% HERON HARD FESCUE
10% SHAMROCK KENTUCKY BLUEGRASS

SOW SEED AT ONE POUND PER 200 SQUARE FEET. SEED IS AVAILABLE FROM D-F MARKS CO., WOODINVILLE, WASHINGTON.

BARK MULCH ONLY

REVISIONS

SYMBOL	ZONE	DESCRIPTION	DATE	BY

REDUCED TO 50% OF FULL SIZE

U.S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

SQUAK VALLEY SECTION 206 PROJECT

PLANTING LEGEND

ISSAQUAH WASHINGTON

SIZE	INVITATION NO.	FILE NO.	DATE	PLATE
D		C-4-4-125	10JULY03	L-1
DSGN. REID		CHK.	SHEET 13	

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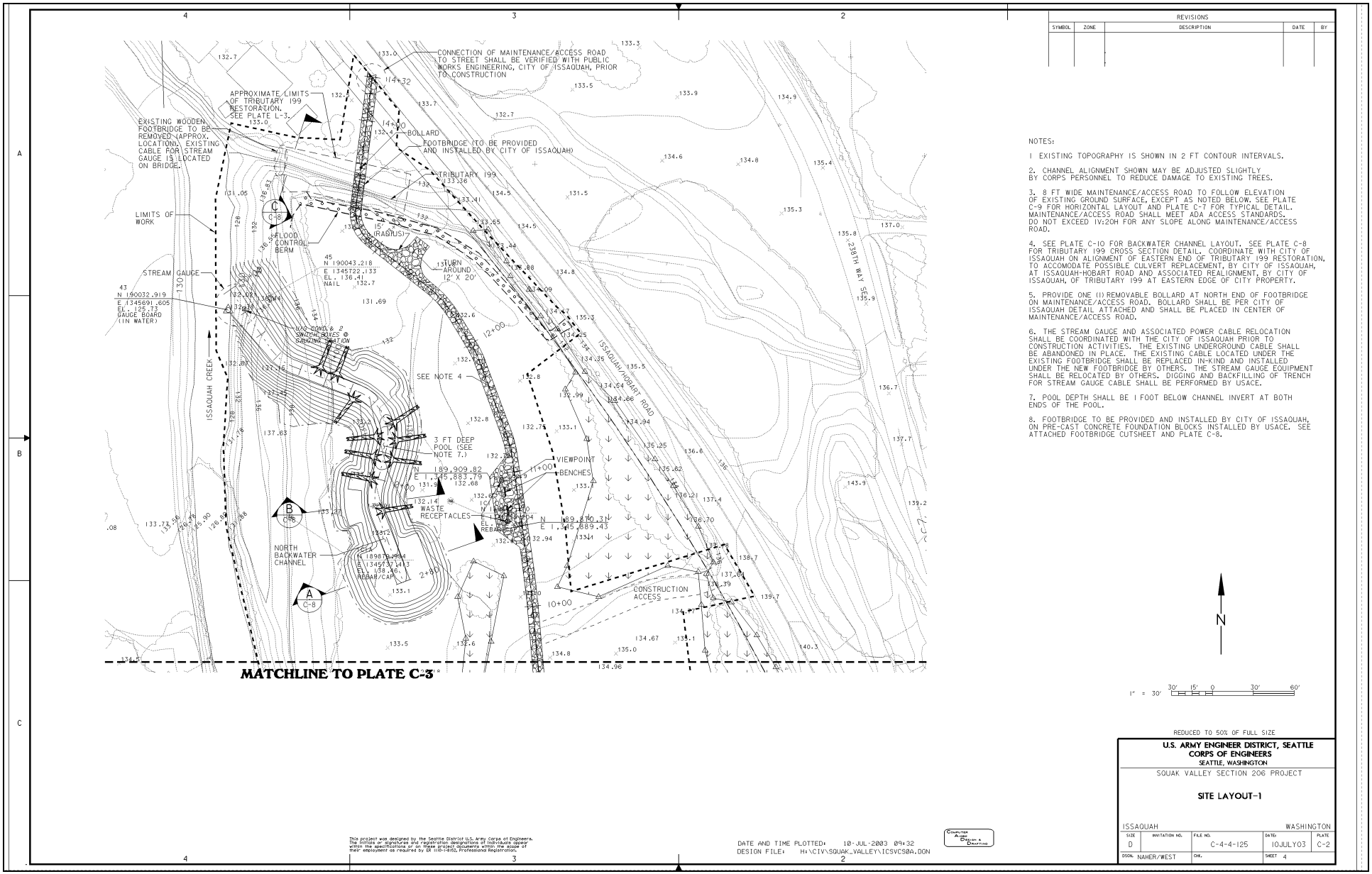
DATE AND TIME PLOTTED: 10-JUL-2003 09:47
DESIGN FILE: H:\CIV\SQUAK_VALLEY\ICSVLP00E.DGN

Figure A-2. Legend and Notes



REVISIONS				
SYMBOL	ZONE	DESCRIPTION	DATE	BY

NOTES:

1. EXISTING TOPOGRAPHY IS SHOWN IN 2 FT CONTOUR INTERVALS.

2. CHANNEL ALIGNMENT SHOWN MAY BE ADJUSTED SLIGHTLY BY CORPS PERSONNEL TO REDUCE DAMAGE TO EXISTING TREES.

3. 8 FT WIDE MAINTENANCE/ACCESS ROAD TO FOLLOW ELEVATION OF EXISTING GROUND SURFACE, EXCEPT AS NOTED BELOW. SEE PLATE C-9 FOR HORIZONTAL LAYOUT AND PLATE C-7 FOR TYPICAL DETAIL. MAINTENANCE/ACCESS ROAD SHALL MEET ADA ACCESS STANDARDS. DO NOT EXCEED IV:20H FOR ANY SLOPE ALONG MAINTENANCE/ACCESS ROAD.

4. SEE PLATE C-10 FOR BACKWATER CHANNEL LAYOUT. SEE PLATE C-8 FOR TRIBUTARY 199 CROSS SECTION DETAIL. COORDINATE WITH CITY OF ISSAQUAH ON ALIGNMENT OF EASTERN END OF TRIBUTARY 199 RESTORATION, TO ACCOMODATE POSSIBLE CULVERT REPLACEMENT, BY CITY OF ISSAQUAH, AT ISSAQUAH-HOBART ROAD AND ASSOCIATED REALIGNMENT, BY CITY OF ISSAQUAH, OF TRIBUTARY 199 AT EASTERN EDGE OF CITY PROPERTY.

5. PROVIDE ONE (1) REMOVABLE BOLLARD AT NORTH END OF FOOTBRIDGE ON MAINTENANCE/ACCESS ROAD. BOLLARD SHALL BE PER CITY OF ISSAQUAH DETAIL ATTACHED AND SHALL BE PLACED IN CENTER OF MAINTENANCE/ACCESS ROAD.

6. THE STREAM GAUGE AND ASSOCIATED POWER CABLE RELOCATION SHALL BE COORDINATED WITH THE CITY OF ISSAQUAH PRIOR TO CONSTRUCTION ACTIVITIES. THE EXISTING UNDERGROUND CABLE SHALL BE ABANDONED IN PLACE. THE EXISTING CABLE LOCATED UNDER THE EXISTING FOOTBRIDGE SHALL BE REPLACED IN-KIND AND INSTALLED UNDER THE NEW FOOTBRIDGE BY OTHERS. THE STREAM GAUGE EQUIPMENT SHALL BE RELOCATED BY OTHERS. DIGGING AND BACKFILLING OF TRENCH FOR STREAM GAUGE CABLE SHALL BE PERFORMED BY USACE.

7. POOL DEPTH SHALL BE 1 FOOT BELOW CHANNEL INVERT AT BOTH ENDS OF THE POOL.

8. FOOTBRIDGE TO BE PROVIDED AND INSTALLED BY CITY OF ISSAQUAH, ON PRE-CAST CONCRETE FOUNDATION BLOCKS INSTALLED BY USACE. SEE ATTACHED FOOTBRIDGE CUTSHEET AND PLATE C-8.

REDUCED TO 50% OF FULL SIZE

U.S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

SQUAK VALLEY SECTION 206 PROJECT

SITE LAYOUT-1

ISSAQUAH WASHINGTON

SIZE	INVITATION NO.	FILE NO.	DATED	PLATE
D		C-4-4-125	10JULY03	C-2

DSGN. NAHER/WEST CHK. SHEET 4

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DATE AND TIME PLOTTED: 10-JUL-2003 09:32
DESIGN FILE: H:\CIV\SQUAK_VALLEY\ICSVCS0A.DGN

Figure A-3. Site Plan – North.

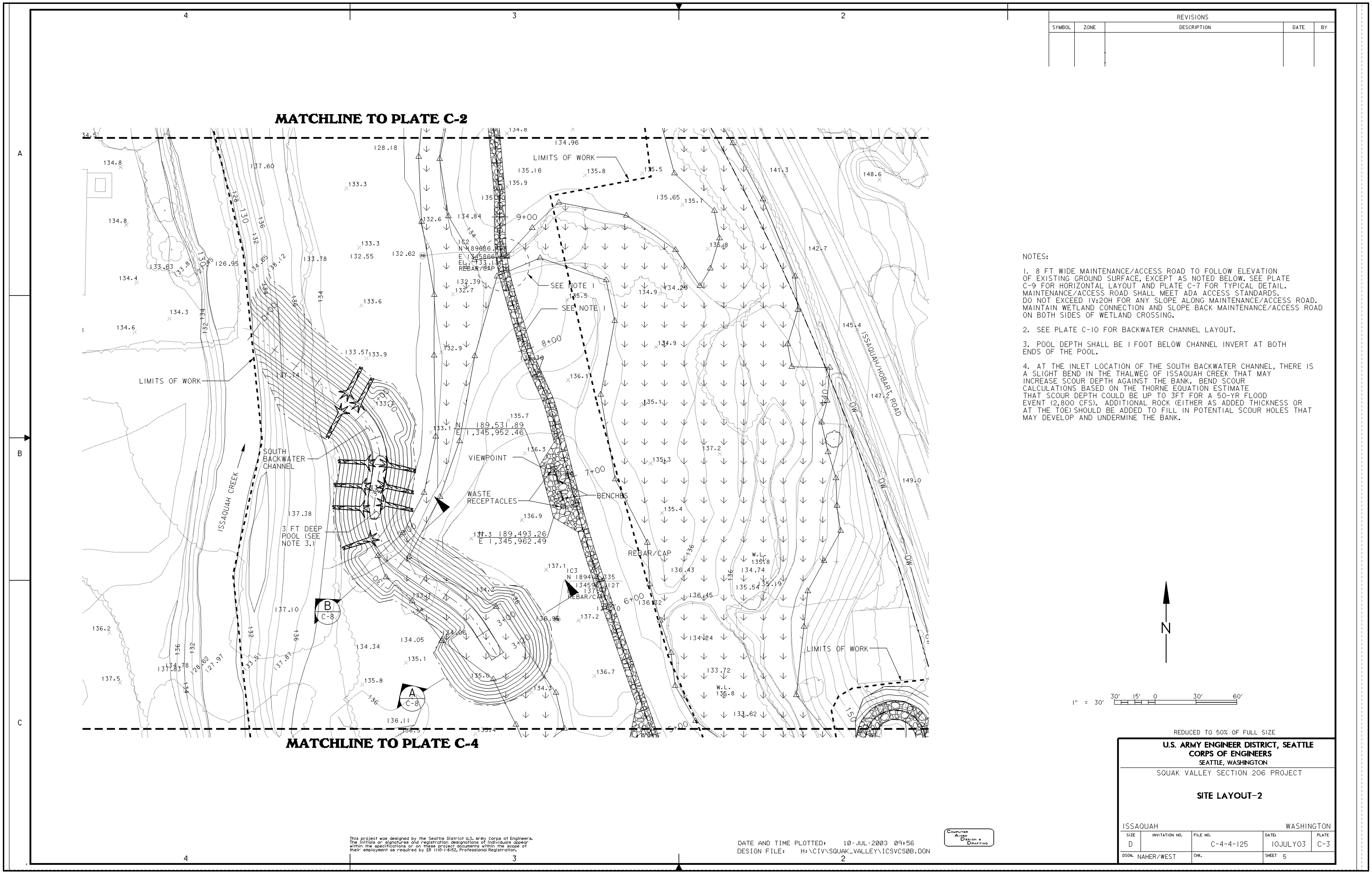


Figure A-4. Site Plan – Central.

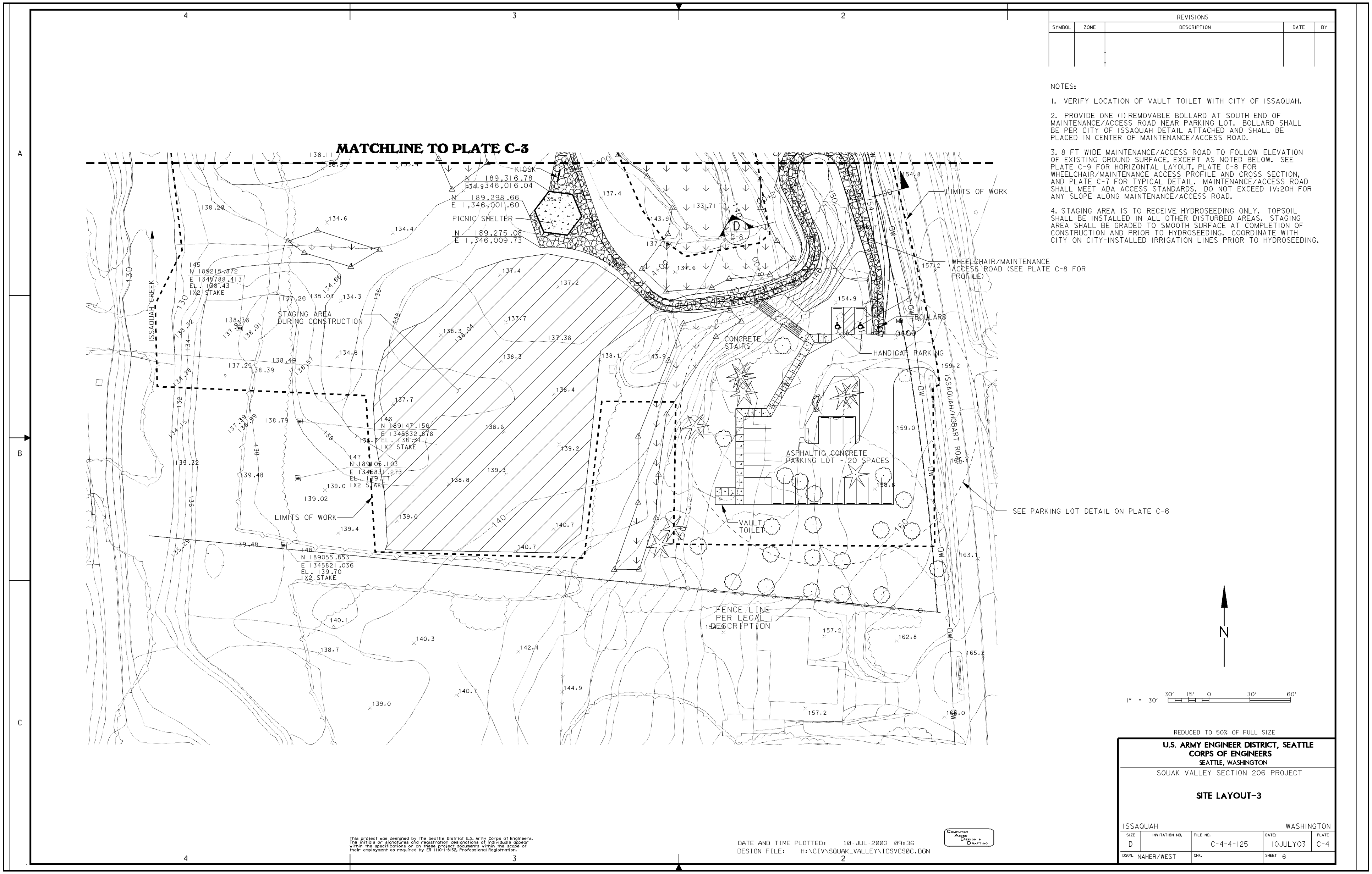


Figure A-5. Site Plan – South

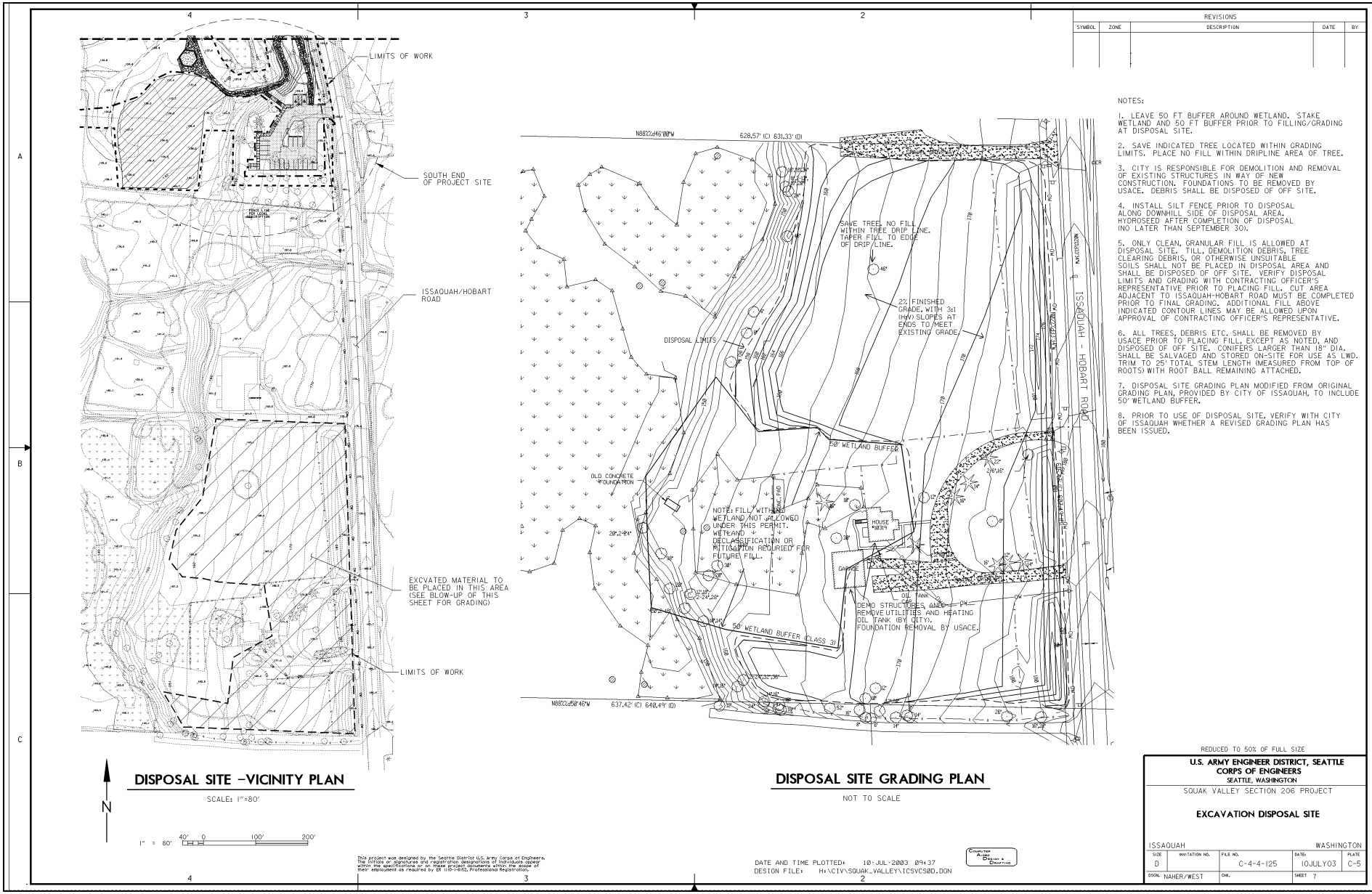


Figure A-6. Disposal Site.

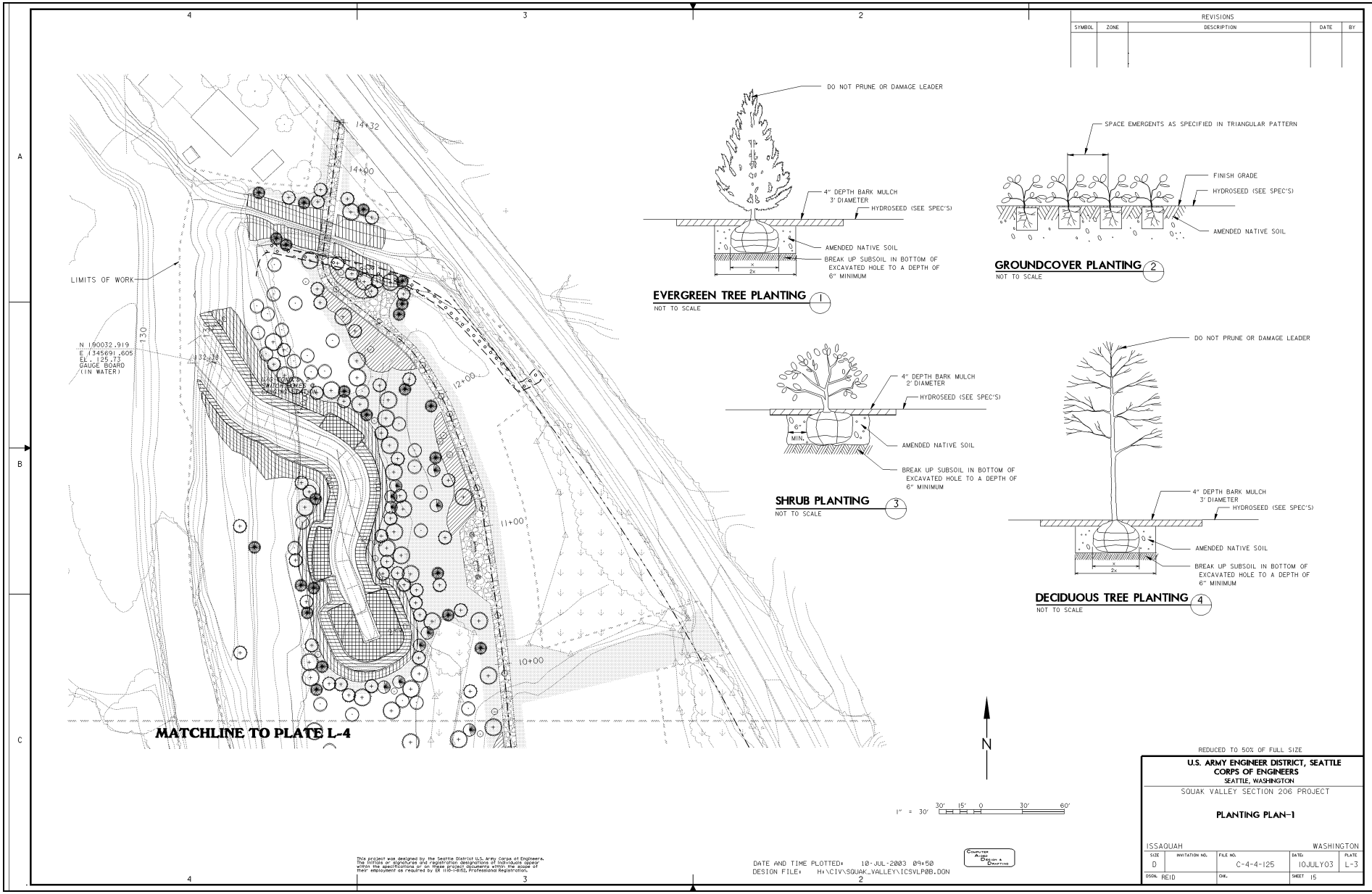


Figure A-7. Planting Plan – North.

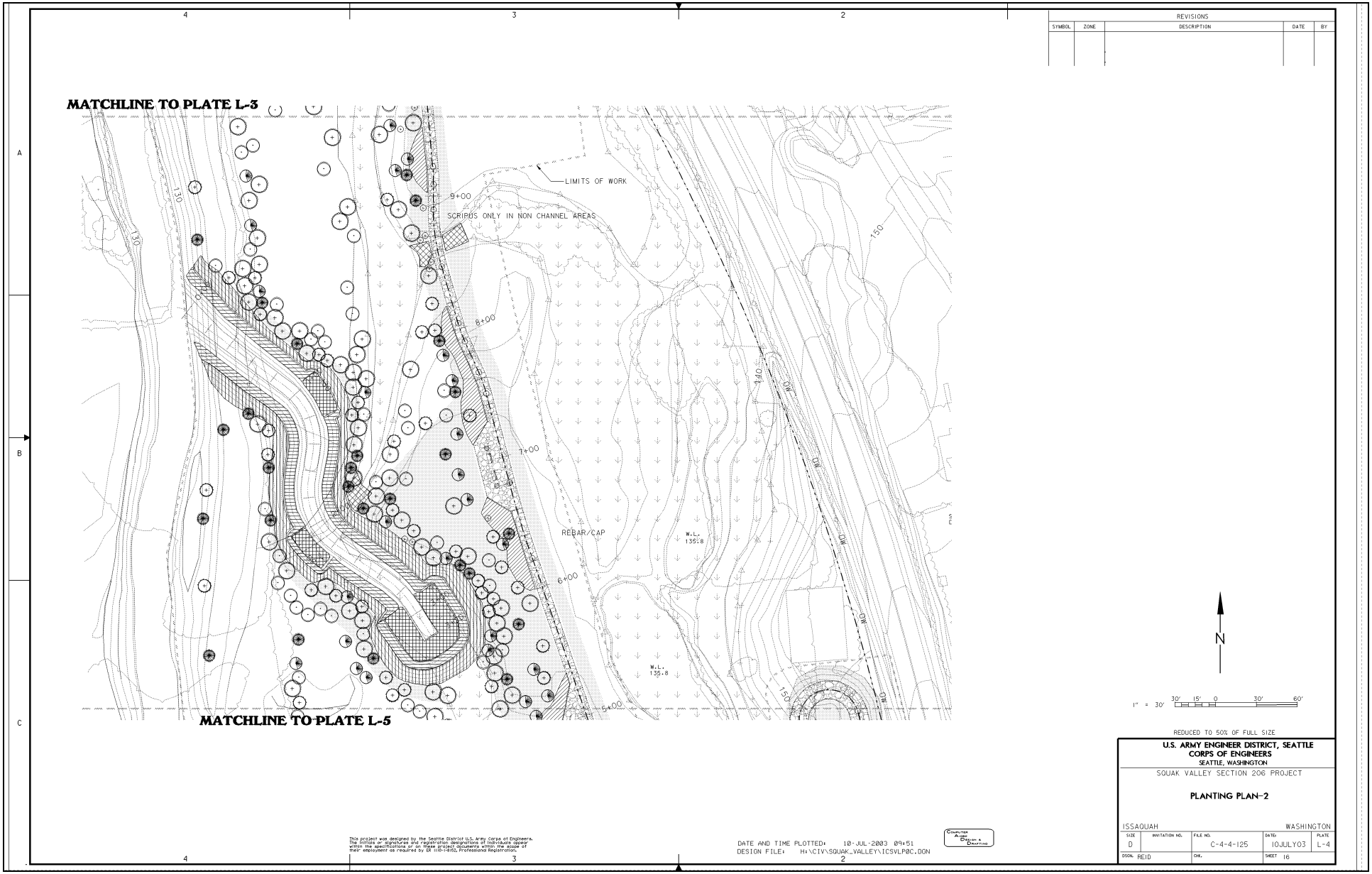


Figure A-8. Planting Plan – Central.

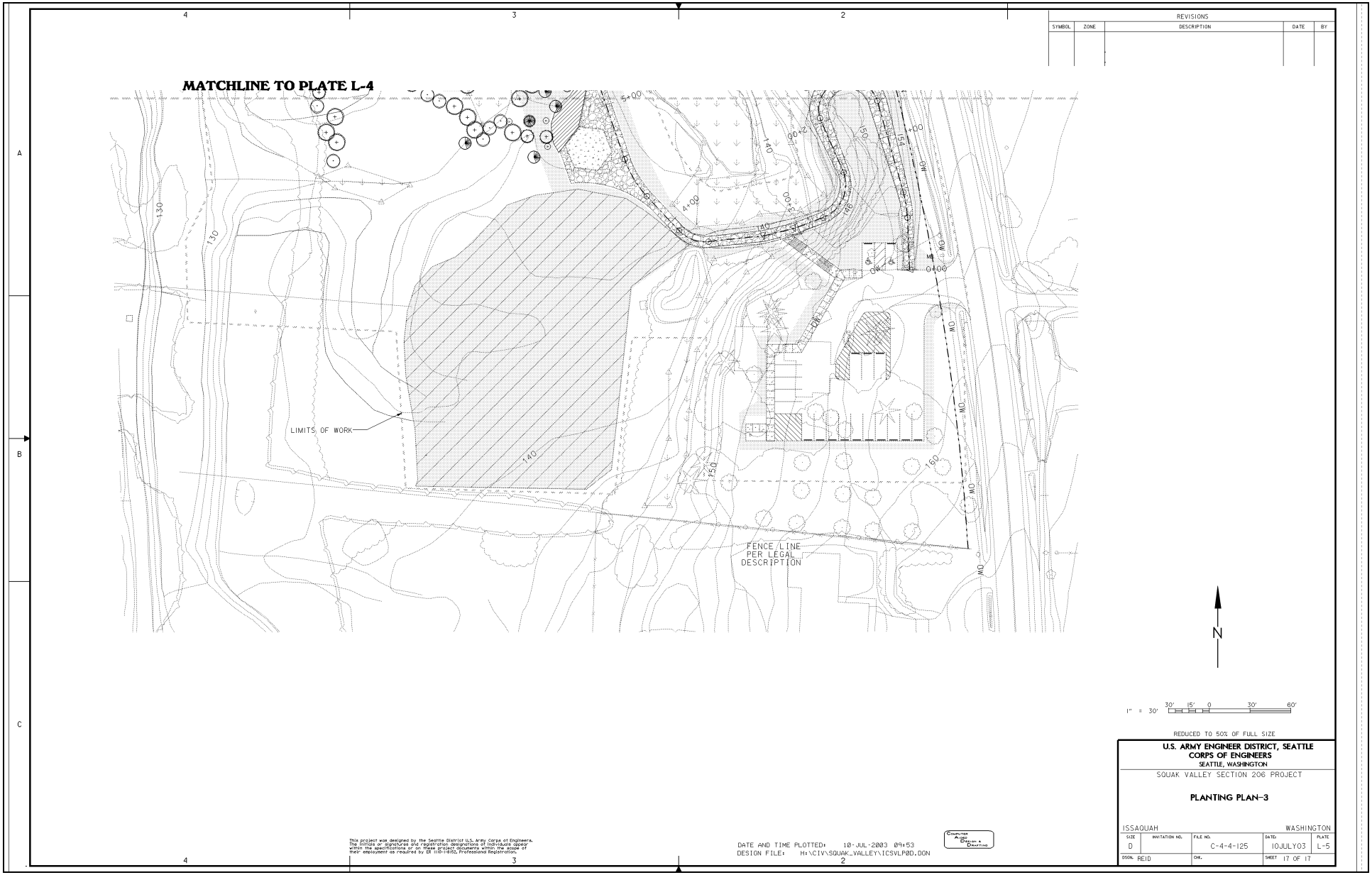


Figure A-9. Planting Plan – South.

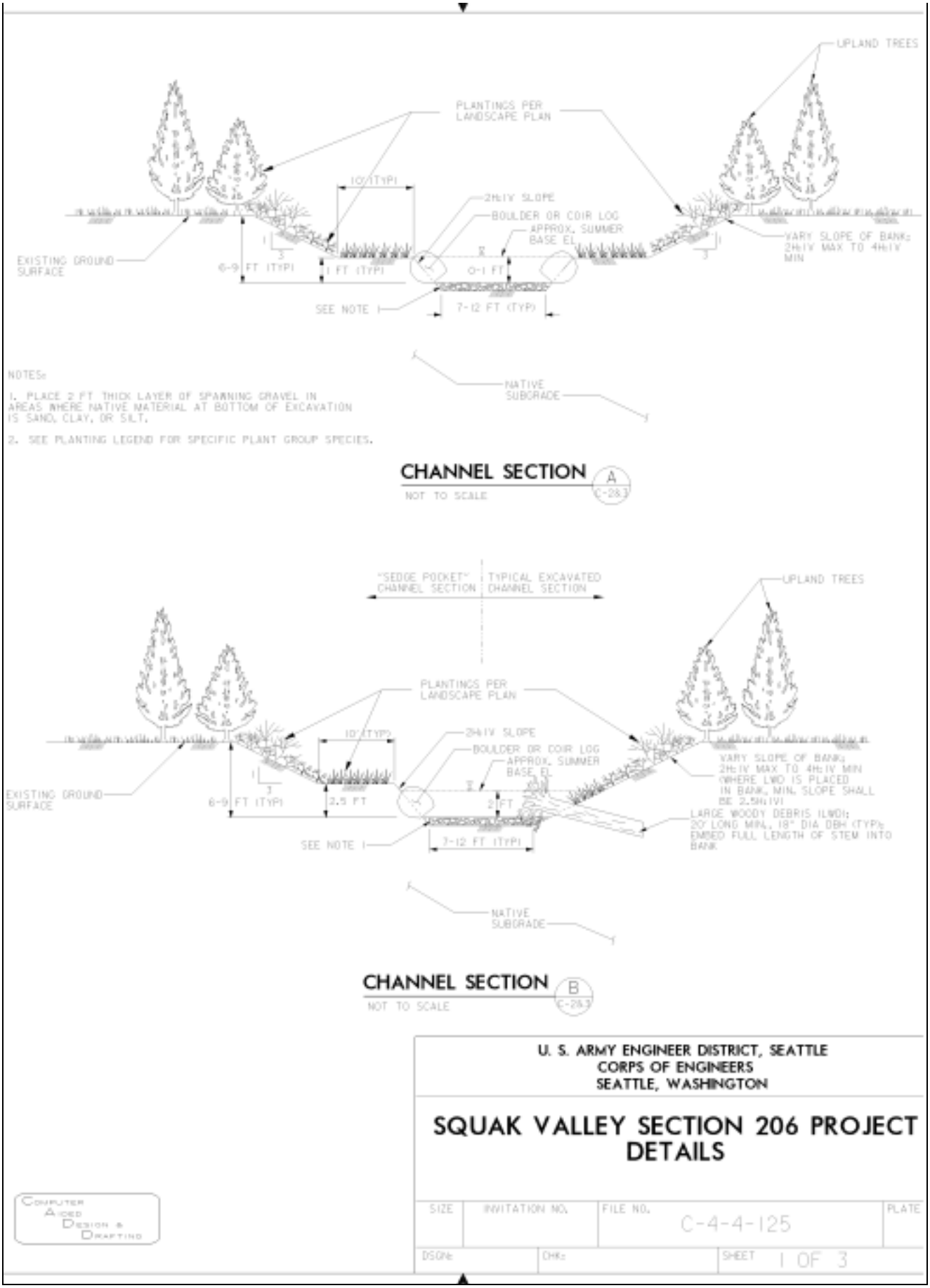
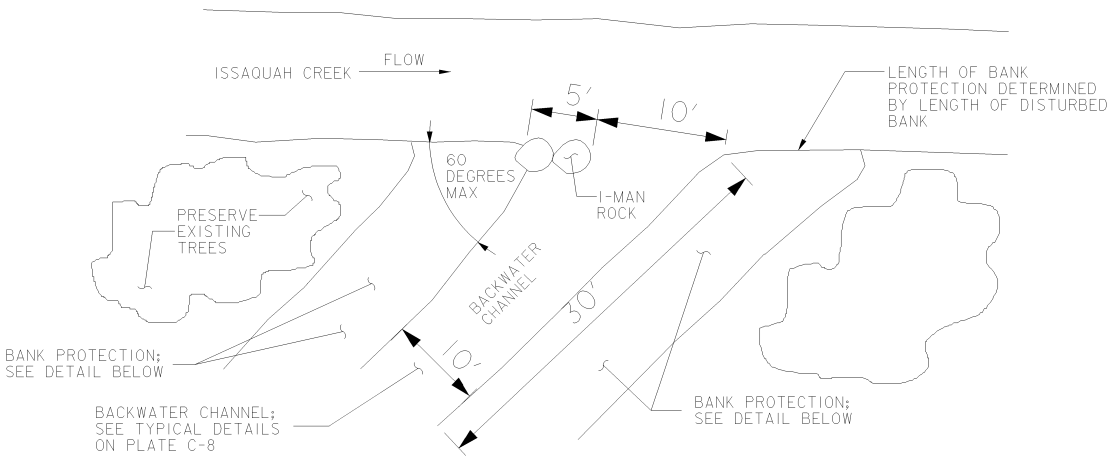
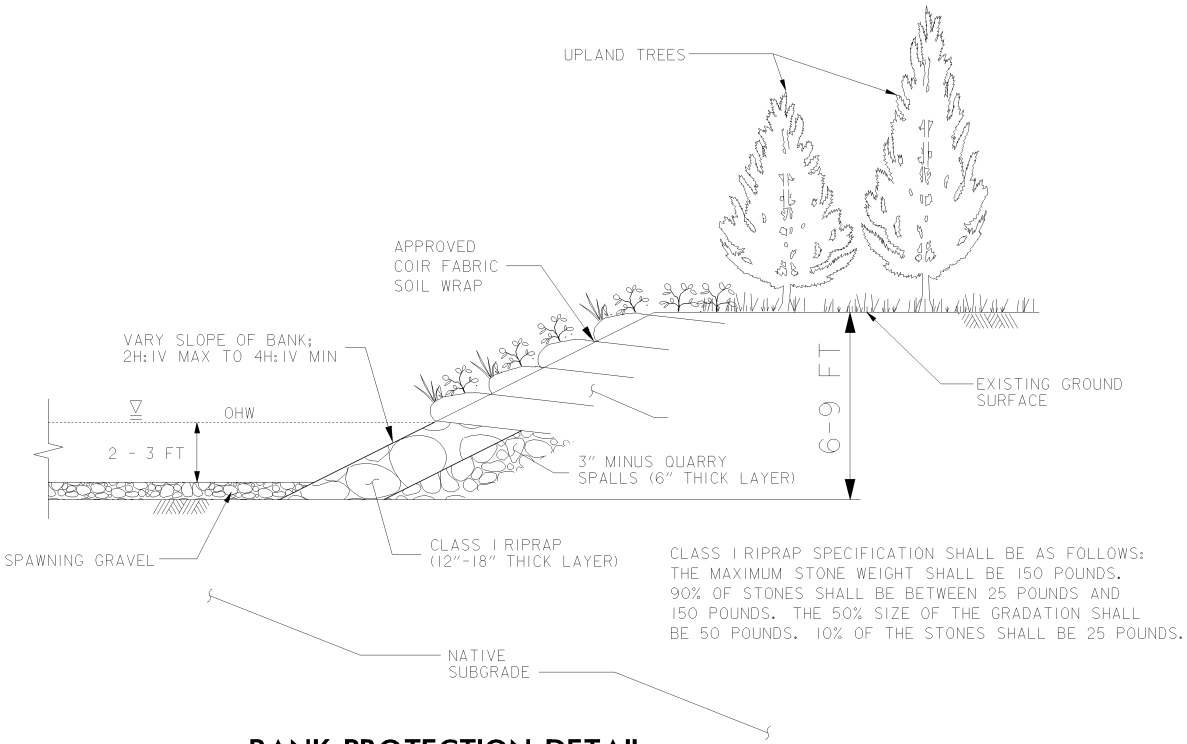


Figure A-10. Backwater Channel Cross-Section Details.



BACKWATER CHANNEL MOUTH (PLAN)

NOT TO SCALE



BANK PROTECTION DETAIL

NOT TO SCALE

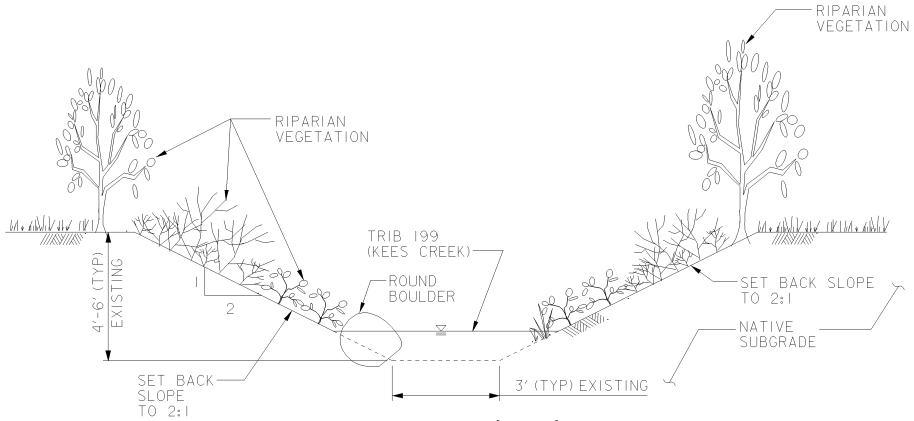
U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

SQUAK VALLEY SECTION 206 PROJECT DETAILS

COMPUTER AIDED DESIGN & DRAFTING

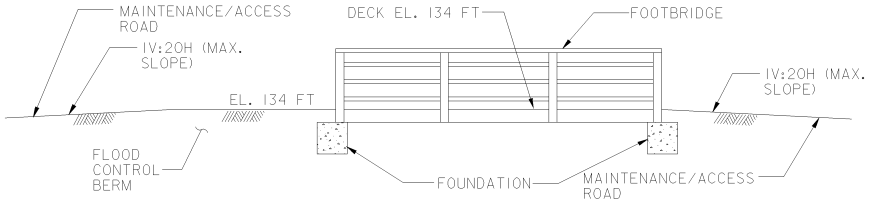
SIZE	INVITATION NO.	FILE NO.	PLATE
		C-4-4-125	
DSGN:	CHK:	SHEET 2 OF 3	

Figure A-11. Backwater Channel Inlet Details.



TRIB 199 SECTION (TYP) C-2

NOT TO SCALE



FOOTBRIDGE SECTION E C-2

NOT TO SCALE

U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

SQUAK VALLEY SECTION 206 PROJECT DETAILS

COMPUTER AIDED DESIGN & DRAFTING

SIZE	INVITATION NO.	FILE NO.	PLATE
		C-4-4-125	
DSGN:	CHK:	SHEET 3 OF 3	

Figure A-12. Tributary 0199 (Kees Creek) Details.

APPENDIX B

Site Photographs

Figure B-1. Overview of site from southeast corner of site looking towards the northwest.

Figure B-2. Overview of site from southeast corner looking towards the southwest.

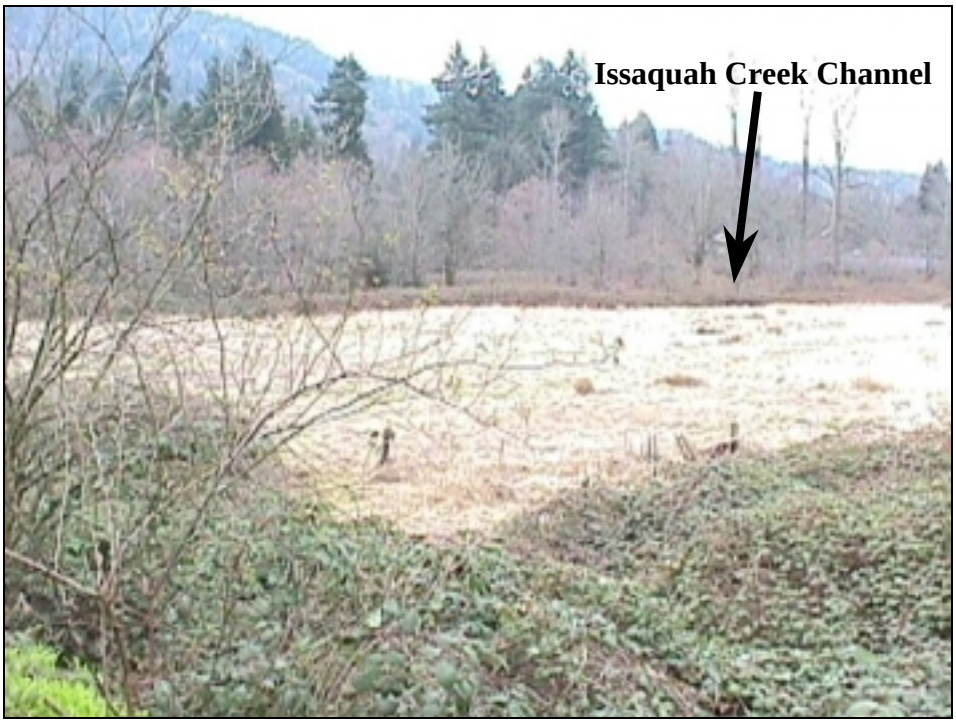


Figure B-3. Approximate Location of Upstream (Southern) Levee Breach

Figure B-4. Approximate Location of Downstream (Northern) Levee Breach

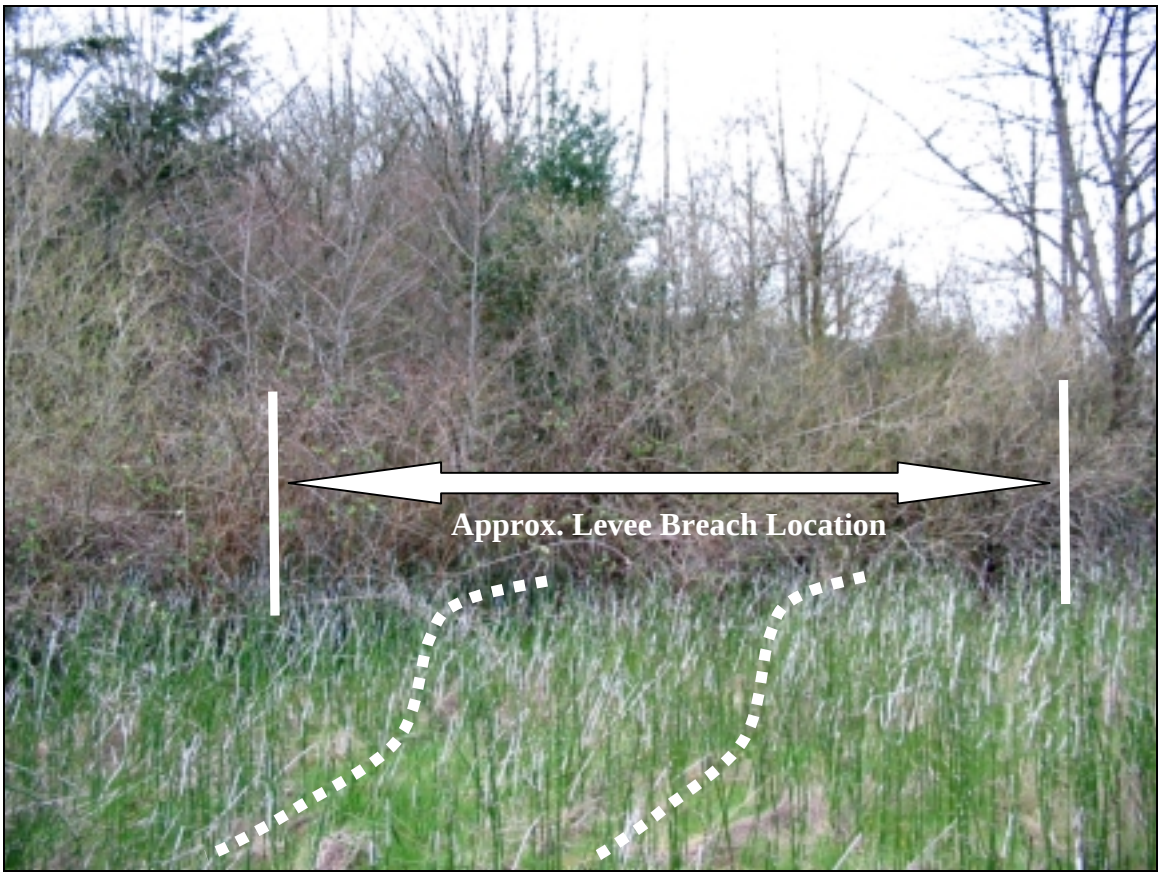


Figure B-5. Tributary 0199 in area to be graded and planted with native riparian species (looking upstream from near mouth).

Figure B-6. Downstream view of Issaquah Creek from near middle of project reach showing typical streambank and channel condition.